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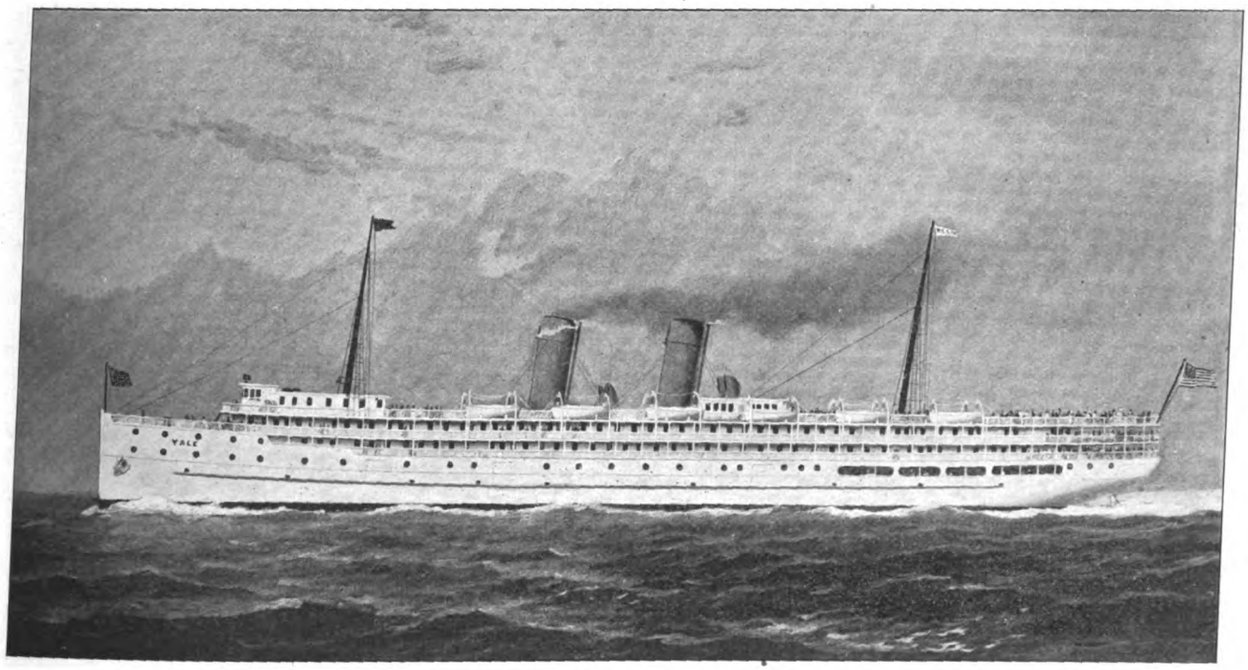
LIFE-SAVING SERVICE.

The following is a brief summary of the work of the life-saving service for the last fiscal year, as shown by the annual report of Gen. Supt. Kimball. At the close of the year the life-saving establishment comprised 279 stations, located at the most dangerous points on our ocean and lake coasts from Quoddy Head, Maine, to Nome, Alaska. The distribution of stations is as follows:

On the Atlantic and Gulf coasts, 200; on the Great Lakes, 60; on the Pacific coast of the United States proper, 16; and one each at Louisville, Ky. (falls of the Ohio river), and Nome, Alaska.

During the twelve months from July 1, 1905, to June 30, 1906, 357 documented vessels met with disaster within the scope of the station operations. On board these vessels were 4,099 persons, 19 of whom lost their lives. The estimated value of the vessels was $10,187,545, and of their cargoes $4,548,805, making the total value of property imperiled $14,736,350. Of this amount $11,972,280 was saved and $2,764,070 lost. The number of vessels totally lost was 40. Undocumented craft, such as sail and power boats, rowboats, etc., to the number of 491 also sustained casualties in the vicinity of life-saving stations. On these 1,221 persons were imperiled, 10 of whom were lost. The estimated value of property in these cases was $304,790, of which approximately $293,820 was saved and $10,970 lost. Persons rescued from shipwreck are usually destitute of all means, and frequently almost naked, injured, or badly frozen. To such, shelter and food are provided at the stations, and clothing donated by the Women's National Relief Association is also furnished when necessary. During the year 1,727 days' relief was furnished to 811 persons under such circumstances, and necessary articles of clothing were supplied to 166 persons.

The foregoing figures aggregate as follows:



TURBINE STEAMER YALE RECENTLY LAUNCHED AT ROACH'S SHIP YARD, CHESTER, PA., FOR THE METROPOLITAN STEAMSHIP CO., OF NEW YORK. THIS STEAMER IS 407 FT. OVER ALL; 63-FT. BEAM OVER GUARDS; 16-FT. DRAUGHT

Number of disasters	848
Number of vessels totally lost	49
Number of persons involved	5,320
Number of lives lost	29
Number of persons succored at stations	811
Number of days' relief afforded	1,727
Value of vessels involved	$10,492,335
Value of cargoes	$ 4,548,805
Total value of property involved	$15,041,140
Value of property saved	$12,266,100
Value of property lost	$ 2,775,040

The life-saving crews also rendered assistance of more or less importance to 397 other vessels, making the total number to which aid was extended 1,245. In addition to this, ninety-seven steamers and seventy-seven sailing vessels which

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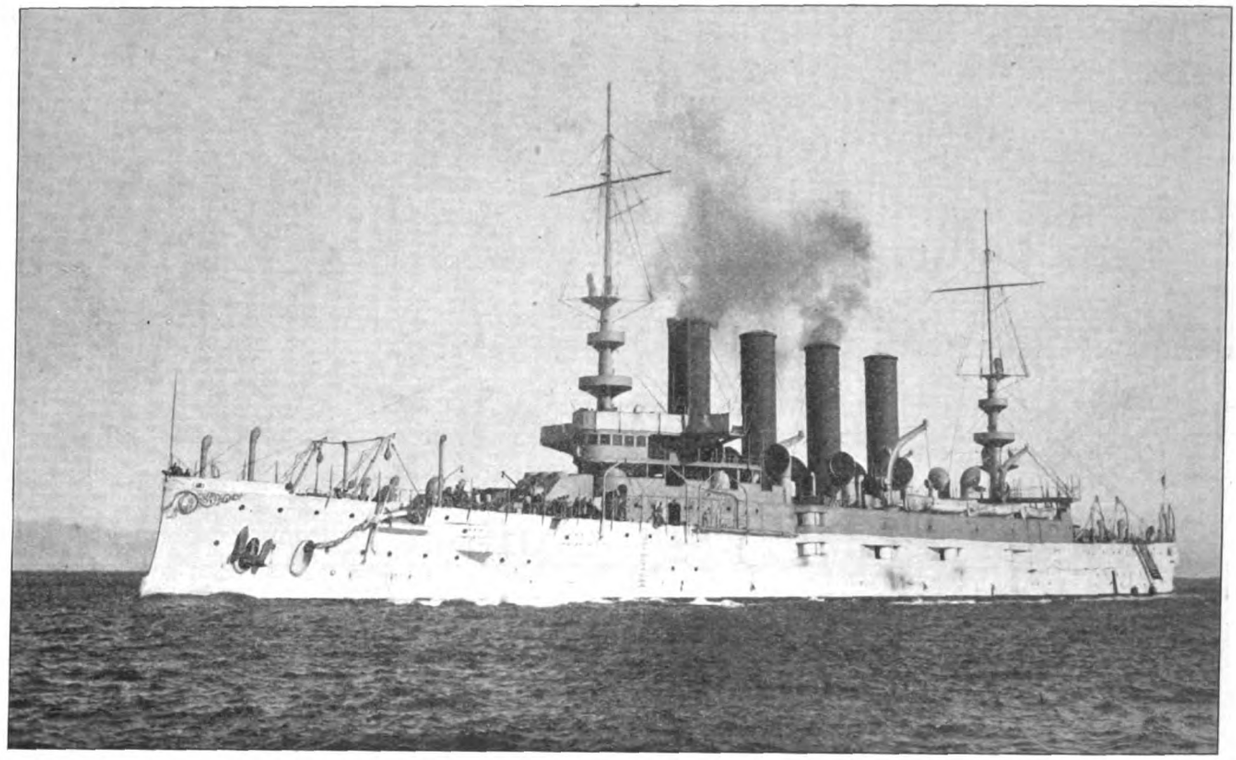

ARMORED CRUISER SOUTH DAKOTA JUST AFTER LEAVING THE YARD OF THE UNION IRON WORKS, SAN FRANCISCO, FOR HER TRIAL TRIP. THIS CRUISER COVERED A MEASURED MILE UPON HER TRIAL AT THE RATE OF 22.87 KNOTS. DURING A STRAIGHT RUN OF FOUR HOURS IN SANTA BARBARA CHANNEL THE SOUTH DAKOTA COVERED 22.24 KNOTS AN HOUR.

were discovered running into danger were warned by the patrolmen and station lookouts, and thereby saved from possible disaster. 161 of these cases occurred at night, and thirteen during the day, in thick weather. These warnings undoubtedly averted many disasters which would have caused the loss of life and property, but no satisfactory estimate of the services rendered by the crews in this way can be made.

The activities of the life-savers are not confined, however, to operations in connection with shipwrecks. They render valuable service in many and varied directions, such as rescuing bathers or persons who have fallen into the water from docks, floats, etc., recovering bodies of the drowned, assisting at fires, and succoring persons in distress in the vicinity of the stations. The alert and unremitting lookout that is kept from the station tower puts them in a position to render peculiarly prompt and effective assistance in all cases of sudden need. During the year the lives of 66 persons which were endangered in various ways not connected with vessels were thus saved.

The report contains a brief tabulated statement of the operation of the service since the establishment of the present system, November 1, 1871, to the close of the last fiscal year, as follows:

Total number of disasters.....	16,479
Total number of persons involved..	116,442
Total number of lives lost.....	1,127
Total number of persons succored at stations	19,741
Total number of days' succor afforded	47,555
Total value of vessels involved....	$171,505,865
Total value of cargoes.....	$ 71,177,834
Total value of property involved...	$242,683,699
Total value of property saved.....	$192,024,612
Total value of property lost.....	$ 50,659,087

The net expenditure for the maintenance of the service during the year was $1,832,465.93.

Extensive improvements were made to a number of stations and minor repairs to a large number of others. Sites were selected for two additional stations on the coast of Virginia and one on Neah bay (Puget Sound), Washington, and titles have been secured to sites for one station each in Michigan, Oregon and Delaware. The stations in the vicinity of San Francisco suffered more or less damage in the earthquake which visited that section in April last, and the storehouse of the service in San Francisco was destroyed, entailing the loss of life-saving apparatus and station supplies to the value of several thousand dollars. Upon this occasion the life-savers rendered much valuable service in fighting the fire, transporting supplies, assisting the homeless, and in other ways ministering to the needs of the earthquake sufferers.

Notable progress has been made in the perfecting of power installation in lifeboats. This problem has engaged the service for several years, the desideratum being a boat with adequate power without the sacrifice of the self-righting property of the lifeboat, or materially reducing its carrying capacity. It is believed that this problem has now been solved, and during the year seven of the largest size lifeboats were equipped with gasoline engines, and one new power boat constructed. The results attained have demonstrated the great value of this addition to the life-saving equipment. These boats have greatly enlarged the radius of effective action of each station supplied with one, enabling the crews to cover great distances more speedily, and with the men fresh and active for the actual operations at the wreck, rather than, as has often been the case, nearly exhausted by their efforts to reach the vessel.

The general superintendent makes his usual appeal for the extension of the benefits of retirement to the officers and men of the service who become disabled through injury or disease contracted in the service and through the infirmity of age, and states that the lack of adequate inducements for the retention of the best men in the service and the enlistment of suitable recruits has already begun, as he has so often predicted, to seriously affect the efficiency of the personnel of the service.

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Naval Architects and Marine Engineers

The next paper read was upon the subject, "Recent Developments in Armor and Armament," by John F. Meigs. The opening paragraph which was the key to his paper was as follows:

"The tendency in the past few years has been to increase the area of the sides of ships covered by armor, and to increase the power, as it is called, of the guns. The gun's power is said to increase when the velocity increases, which, since pressures cannot be raised, means when the gun is made longer. The energy of the blow delivered by a gun, that is, the mass of the shot multiplied by the square of the velocity, does not necessarily increase with its power, so-called. Armor has improved materially by the improvement of the hardness of its exterior face and also the toughness of its back, which latter quality resists cracking and disintegration; and at the same time the projectiles have improved by some betterment of shape and by hardening their front part and toughening their rear. This contest between the efficiency of armor and projectiles has been going on ever since the introduction of armor plate 50 years ago; and while it has been said from time to time that the projectile or the armor was ahead in the race for efficiency, it is difficult to say exactly what has been the truth at one period or another, since the conditions are perhaps not always fully and correctly stated. The larger guns of ships can now penetrate the thicker armor used at 3,000 or 4,000 yards distance in direct impact, but present armor is effective not only in keeping out shell but in keeping out special armor-piercing projectiles whose internal capacity is very small and whose walls are very strong. It is said, on what appears to be good authority, that the thick armor of no ship in the recent war between Japan and Russia was perforated."

Having read the paragraph Mr. Meigs said:

"I want to say a word further about that paragraph, which is not in the text. I do not make my meaning there very clear about the power of guns. It has come to be said that the power of guns has increased enormously of late years. It has seemed to be so, because the guns of fixed caliber have practically doubled in weight. That has been the principal reason. To illustrate, in an interview which I had some five or six years ago in Washington, some one had been saying there that the people making guns all over the world were building 8 in. guns and boring 6 in. holes in them; that is what they have have been doing. The 8 in. gun weighs quite what the 10 in. gun did fifteen or twenty years ago, and the 6 in. gun weighs what the 8 in. gun did, etc., so that there is no great improvement in that way. There are only three ways of getting power out of a gun, three variables; weight of gun, the physical qualities of the gun, and the shape; there is nothing else. The weights have increased, but that is not a real advantage, that is only imaginery. It is the same kind of advantage, I think, that we used, and we did use it, too, the English charged it against us: They said we fought their fleets in the war of 1812 with a disguised line of battleships, and so we did. Our frigates were enormously more powerful than theirs and they did not know it, but should have known it, and they had no one to blame but themselves. As I say, I do not think it is quite an advantage that the guns should have been made heavier. We know the metal is stronger than it used to be, twice as strong as it was fifteen years ago, twice as hard and resisting in its tensile strength and elastic strength as it was thirty years ago. That has led to the raising of pressures, of course in guns, and the raising of pressures has led to what we are all familiar with now in late times, the difficulty of erosion.

As respects the form of the gun, the form of the gun within the last twenty or thirty years, maybe even a little further back than that, so far as the form of the gun is concerned, that has been greatly improved. In the gun, you know, the wall of the gun compresses when the powder pressure comes, and the rings of metal which the gun may be conceived to be made of, pull less the further they are situated from the axis of the gun. If you take a gun of fixed length and weight and make it a cylinder, you will get the best effect out of it as respects the weight of gun. Give it a higher muzzle energy, you increase its power, but you increase the weight of ammunition at the same time, requiring a larger gun. But people say that the power of guns has increased. I think it is one of those popular statements which is more inaccurate than accurate. The principal reason that the power has increased is because they have put on a fixed weight; they have made the gun longer, and bored smaller holes in a given mass of metal. That is not a real improvement and as respects the damage to armor plate it is a retrograde step. I do not want to take any sides in the matter, but would like to state the facts. For example, there was tested at the Sandy Hook proving grounds by the army a gun built at Bethlehem, where I have been for many years, an 18 in. gun, built for the Gatling Torpedo Gun Co., and they were going to destroy a ship from the outside. This gun fired a large shell, as long as I am, or nearly so; we made the shell too, and the walls of the shells were very thin, the shells containing 500 lbs. of guncotton. It had a percussion fuse which was required to burst the shells just right. It was fired in competition with a 12 in. army, 40 caliber gun, practically the same weight, 50 to 55 tons; they were about the same length and weight, but one had an 18-in. bore and the other a 12-in. bore. In the 12-in. gun the projectile weighed 1,000 lbs., and in the case of the 18-in. gun it weighed 2,000 lbs. As people said, after it happened, it was easy to foretell the results, and I think it was; that is to say, the 500 lbs. of guncotton must be put close to the armor, and when it went off it would destroy the armor, but only if it was very near to it. If the fuse acts a little too quickly, or a little too late, the guncotton does not come in contact closely with the armorplate, and perhaps the armorplate will not be destroyed, although the energy released is enormous, and when close to the surface of the armorplate is enough to destroy almost anything at all. The result was a victory for the 12-in. gun. After the gun had been fired Gen. Crozier, who was Capt. Crozier then, said he would like to see a regular armor-piercing projectile fired out of the gun. I said, "Captain, that is the greatest armor-smasher in the world;" and that gun remains today as the greatest armor-smasher. To show what I mean, we sent armor plates constantly from the Indian Head Proving Grounds to the Sandy Hook Proving Grounds for tests to be made by the government. They have a table in which is laid down velocities for the guns to be fired. The caliber of the guns to be fired is about the thickness of the armorplate. Sometimes they will fire an 8-in. gun at a 7-in.

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plate, or sometimes a 10-in. gun at a 9-in. plate, but as a rule the thickness of the plate runs about the caliber of the gun, but where it differs from the caliber somewhat, they use the same energy. But if they should send the 18-in. gun to Indian Head and the officer in charge should say he will fire that 18-in. gun at an 18-in. plate, the Bethlehem representative would say he did not want it fired at that plate; that it was not in accordance with the contract, but if the officer says, I will fire it at the same striking energy, reducing the velocity of the 18-in. gun, so that the striking energy on the plate for the 2,000 lb. projectile shall be the same as the striking energy of the 850 lb. projectile upon the 12-in. plate, the representative would say it is not in accordance with the contract and we will not stand for it; but he would not offer to do that, because it would break the plate. The caliber is a tremendous thing in an armorplate. That is another thing which I think myself, that is my individual opinion entirely —the fact is I differ from most people, I think the people have lost a full sense of the effects of caliber very largely in the past. If I am right, then people are wrong, as to building 8-in. guns and boring 6-in. holes in them. The advantage which the navy should appreciate and fully realize is the flatness of trajectory, high velocity, the same thing that the backwoodsmen want to realize when they use peashot to kill a deer; high velocity, and energetic trajectory, — the danger space is so much longer. I have gotten away from my paragraph, but what I want to say is that the popular opinion or notion as read so often, about the enormous increase in the power of modern guns is almost entirely falacious; the increase in 6-in. or 8-in. or 10-in. guns has been enormous, but their weight is twice what it used to be, and that is the principal reason why the power should be greater."

Continuing at another point of the paper Mr. Meigs said:

"It seems to me that no one can deny that the speed of a ship, for ships fighting one another, is more important than the speed of the fleet. Ship fleets are easier to handle than they used to be, but are still hard to handle, but for the purposes of actual engagement, I am not worrying much about the speed or how the ship gets near the enemy—he will get there the best way he can—I do not think the speed of the fleet is as important as the speed of one ship.

On page 6, after "small ones:" So far as I know the first published statement in regard to this matter was made by the so-called Taft board, which was supplemental to the Endicott board, many years ago and examined into the defenses, more particularly of the insular defenses, of this country. Of course, it is already published and the matter is touched on again in the last annual report of the chief of ordnance of the army, and it is probable they will use 14-in. guns instead of 12-in. guns, in order to avoid and lessen the erosion. That matter affects several things. In the first place, it will lessen the weight of the armor necessary to protect the gun, the barbette and turret will be of less weight, but the ammunition will be of greater weight if the same number of rounds is carried.

On page 8: The criticism against that is that the top of the barbette is practically on line with the deck of the ship and water would enter. My answer to that is that that is not sufficient reason for carrying around 40 or 50 tons of armor, and the water can be kept out more easily than by the armor. The watersheds which the battleships have are about as high as a man's waist and throw the water off, and possibly a sheet iron shield could be filled just in front of the barbette. The reason we make the turret shallower at the top is that when the turret goes down it enables you to use a smaller barbette. The size of the barbette is controlled by the length of the gun, from the axis of the trunnions back to the ammunition pile when it is in place. In the plan here shown the principal difference is that the turret is deeper in order to bring the barbette, so to speak, lower in the angle over which the gun swings, but thereby the barbette is shrunk. That saves a matter of about 50 tons.

At the end of the paper: I will not read all this, but would like to say to those who are interested if they will look at the plates they will see in order to get these comparisons we had to have equal motion and some means of measuring a man's skill, and that was done with a target which moved up and down on a vertical guide, a paper target, and the cord passes from the target over a pulley; the fixed point of that cord was moved over curves which were continuous circles, but they were not absolutely correct. The target's motion was not quite the same as the sea, but pretty near to it, rapid in the middle and slowing off in the end. The shape of the curve is given. They used circles, which gave a roll going all the way from 1 degree to 10 degrees; the maximum angle through which the gun swung was 20 degrees, and that takes the pointer from his knees to his tiptoes. When the muzzle of the gun comes up he gets on his knees. People will perhaps hardly believe it, but men who have been to sea won't believe you can hit a target at sea from a ship rolling 10 degrees at 3,000 or 4,000 yards. The target we had was of the width to represent the side of the Kentucky at 9,000 yds. We used a 22-caliber bullet, fired at the target, with the man's right hand moving around, that actuated the trigger of the gun, and as I said the target was a little bit wider than the bullet. I hit it myself on a 10 degree roll. The secret was in following it up and down, and being near it when it stopped; it stopped when it reversed the motion, and if you are close to it then you can hit it.

The President—This paper by Mr. Meigs is now open for discussion.

Capt. William Hovgaard—Mr. Meigs' remarks on the value of great caliber are exceedingly interesting. It is possible that we are again going into a period of increase in size of guns, but it is difficult to express an opinion on this point. I think, however, it is instructive to look back and see what has already taken place in this direction. We have already once passed through a phase of great gun caliber, from which we have settled down to the 12-in. guns for a long time. It was during the '80's, at the time when the admiral class of battleships was built in England, that a very rapid increase of caliber took place, ranging from 12 in., I believe, in the Collingwood, to 16¼ in., 110 ton guns in the Benbow. These ships were followed by the Victoria and Sanspareil, which likewise had 110 ton guns, but here the movement stopped, for the next ships, the Trafalgar and the Nile, had only 13¼ in. guns, I believe, also in France the same movement took place and the heaviest guns of the French navy, 42 cubic centimeters, 77 ton guns, were mounted in the coast defense ships of the "Terrible" class, I believe, during the '80's. The reasons for the sudden decrease in caliber which took place in the Trafalgar were as follows: 1. Great difficulties had occurred with the guns of the Victoria and the Sans Pareil, bending of the bow and bursting of coils. 2. The service of these monster boats was slow on account of the heavy ammunition. 3. The manufacture of such heavy guns took up a very great time, and often the ships had to wait several months for their guns. 4. Without going to much greater displacement than was at that time considered desirable, no more than two guns of

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such great size could be carried. I thought that it would be of interest to look back on these arguments, as they may still to some extent hold good today.

As to the turret construction shown on plate—, I would say that it appears to me that there is a danger of projectiles wedging themselves in between the turret and the barbette. This turret is really a reversion to the old-time closed turret, only the hood is of different shape, but as in the Monitor the turret goes right down to the deck. Now we have seen during the Civil war where turrets were locked by projectiles striking at their base, and it seems to me that this might also occur here. I think it is safer, as is notably the case in the French turrets, to have the hood projecting down below and outside the top of the barbette, which is there of somewhat restricted diameter. These turrets, of course, are balanced.

In the turret shown on plate —, we find a barbette of very reduced diameter, placed under a barbette of larger diameter. This arrangement does not seem to me to be without danger. Shells, especially high explosive shells, bursting against the lower barbette and exploding within the restricted space here found, are, it seems to me, liable to so displace the support for the roller path, placed immediately above, that the roller path may be broken and the turret may be locked.

Mr. H. C. Capdeville—I have but a few short comments to make: May I ask Mr. Meigs, in reference to his statement that in the Bethlehem Steel Co.'s type of 12-in. turret, the guns can be loaded at any angle of elevation, how the ammunition car is stopped to permit loading at any such angle, and if so stopped, how the car can follow the gun while elevating. Tests on ammunition hoists in the present type of turrets have shown the impracticability of running the car at very slow continued speed. This is due to the requirements of fast normal speed and the range of control does not permit a satisfactory slow motion.

There seems to be fourteen electric motors which will require many controlling appliances, switches and rheostats with a large amount of wiring and conduits, all of which will take a lot of space, that I fail to find in this type of turret.

No reference seems to have been made to sighting and training platforms and I can hardly see where they could be located.

The author in his paper makes a claim for saving of weight of 50 tons, effected by compactness in the size of the turret, and also by special arrangement adopted whereby the diameter of the barbette is lessened by 3 ft. Was not that saving of weight obtained without full consideration of requirements of turrets? For example, the roller path is a very important item and should be easily inspected, but for doing so, room is required between its outer diameter and the inside of barbette. It will be impossible to get access there for inspection or to remove any roller pins and consequently any rollers without lifting the whole turret, which is out of the question.

It will be equally impossible to provide adequate means for keeping the water from the barbette at the water shed which is ordinarily fitted cannot be so in this type of turret, due to the transverse armor fastened to the rear overhang. The watershed in such turret should be of a greater importance than on any other, due to the proximity of deck opening, instead, as in other types, the barbette being carried several feet above the deck.

I do not care to make any comment on the greater celerity of ammunition service and on the greater safety in the magazine, as it appears to me that the shell and powder charges are handled four times instead of two, as in the ordinary manner, increasing in my mind the danger resulting of powder bag bursting. Furthermore, in case of any breakdown to the handling room rammer, the service of ammunition would be greatly interfered with if not practically stopped.

The President—Are there any other remarks upon this paper? If not, we will be glad to have Mr. Meigs close the discussion.

Mr. Meigs—As respects the matter that was suggested about the possible spiking between the turret and the barbette, I think that is a thing which cannot be avoided in any balanced turret. All balanced turrets, if I am not mistaken, unless some special means not usual are adopted, must have that, because the gun has to be put close to the turret to make the port opening small, and that means you have a great excess of weight in the front end of the turret and means the whole turret must be moved bodily to the rear. I think all of the turrets recently built in this country are balanced, as far as I am aware, and of course they want to get the guns close to the front plate. That is the great weight in the turret. Not only the gun, but the mount, which weighs half as much as the gun, or more than that, has to be put near the front plate, and as the center of gravity has to be from the center of the barbette, it is necessary that the whole current shall be moved bodily back, and forth, and that means a construction more or less like that shown in the plate has to be adopted. It might be bettered by carrying additional weights, but in some measure that kind of construction must be adopted. As regards the possibility of bursting a shell in that drawway where the turret supports are outside of the barbette, that is, of course, a balancing of evils too. You gain 60 or 70 tons in that way in the designing of the turret, and that is a considerable item, and the answer to the shell, argument is, there is armor outside of that gun, and if there is not, there is the side of the ship. You cannot make shells that will not go on three inches, to go on four inches; that is impossible. If you get them to go at all you are lucky. If you have more than six inch armor outside of the barbette, the shell will be burst by the side of the ship. I do not think unless a very large shell bursts in that construction as shown, I doubt very much whether the roller path would go down. It is a balancing of evils. That is all—it is merely a suggestion, and I doubt not many people have spent some time considering these things. There are shown three different barbettes, but all carry the same turret. If you want one thing, you must leave the other out; that is all that it amounts to.

As to the matter of the ammunition car, we had that at the St. Louis fair, a full size working model there, where the ammunition car latches to the gun body or frame. It is latched with the frame and moves with the frame considerably, throwing a greater load on the riveted car of the gun, but until it is unlatched it moves with the gun, and does not have to be moved after once put in position, because the trajectory comes in first. The rammer makes three strokes, which is automatically controlled by a certain arrangement, to be of proper length and to be automatically returned, so that the rammer comes in and goes out at great speed. We have had a gun of that kind constructed. It is still at Bethlehem, but it is pretty ragged now, because it was built of iron and wood and is warped out of shape. We had at the St. Louis fair a model of it. The ammunition car latched to the gun and stays in position all the time. It is unlatched by mechanical means. A

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man steps on a latch and pulls the trigger. There is a special electrical arrangement whereby the house is kept tight, which was devised by the General Electric Co. There is an objection to it, which perhaps the gentlemen will not appreciate as readily as a line officer of the navy would—there would be a certain jarring of the gun due to the latching of this ammunition car, and probably some variation in its motion or elevation. The man is supposed to keep the sights on and the back end of the gun is going up and down all the time. When it catches and the ammunition car is detached by a man stepping on the treadle, there will be some jarring in the vertical motion of the gun, but I do not think that will be very bad. There is no difficulty about that, because we have had it in operation a long time.

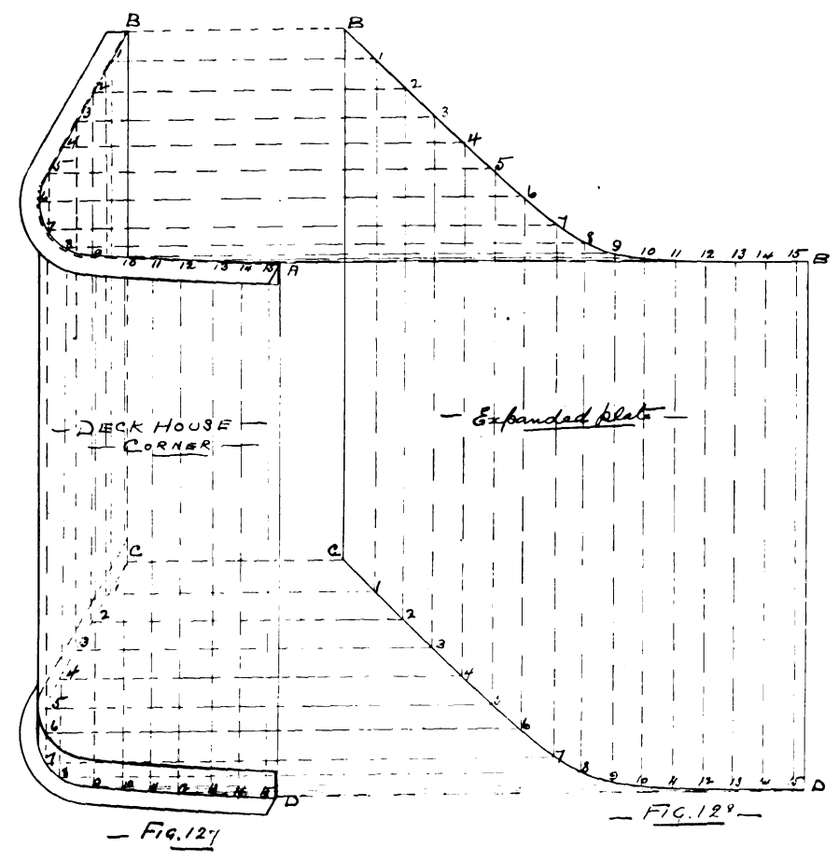
LAKE SHIP YARD METHODS OF STEEL SHIP CONSTRUCTION.

BY ROBERT CURR.

DECK HOUSES.

Fig. 127 shows the corner plate of the after end of house and Fig. 128 shows the expanded plate for same.

To get the true form of the plate ABCD, Fig. 127, the top AB is divided into 15 equal parts as shown by the lines 1 to 15 which are dropped to the line CD as shown by the same numbers. A batten is bent around the line AB and the points 1, 2, 3, etc., to 15, are marked upon it and lined in on the mold loft floor, Fig. 128, parallel to the line AD, Fig. 127.



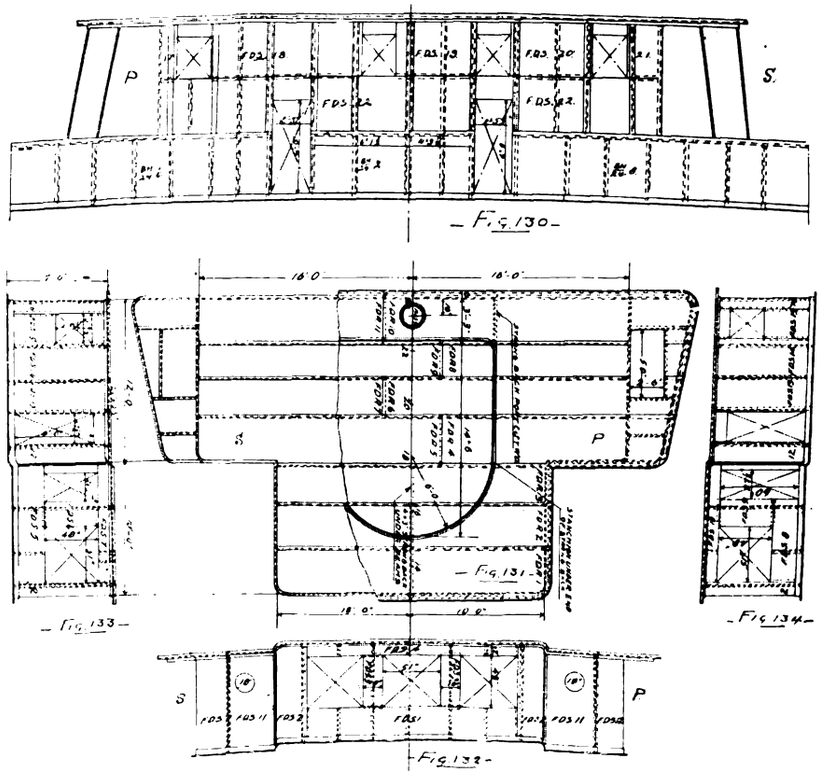
The dotted lines, Fig. 128, parallel to BC numbered 1 to 15, are the lines transferred from the top of the plate AB, Fig. 127, which are run in long enough to receive the lines 1 to 15 from AB, Fig. 127, which are transferred from AB at right angles to AD and BC. The intersection of the lines on Fig. 128, numbered 1 to 15, gives the true shape of the top of the house at this corner and by measuring parallel on the lines BC, 1 to 15 and AD will give points for the bottom.

A batten bent around these intersections will give the expanded plate, Fig. 128.

This expanded plate will do for both sides of the vessel but the same process must be gone through for the corner plates at the fore end of the house. Fig. 129 shows the finished houses forward. Fig. 130 shows the front of the houses forward. The lower part to the forecastle deck is the continuation of the bulkhead from the bottom of the ship and is considered in the laying off of the bulkheads. The upper part is laid off at the same time as the bulkhead, a mold being made for each plate on one side of the bulkhead, the process being similar to the after deck house in laying off the pilasters and stiffeners.

Fig. 131 shows the plan of the top of the forward deck house, the beams, top angles and deck plating are laid off similarly to the after deck house.

Fig. 132 shows the forward end of the forward deck house, which is laid



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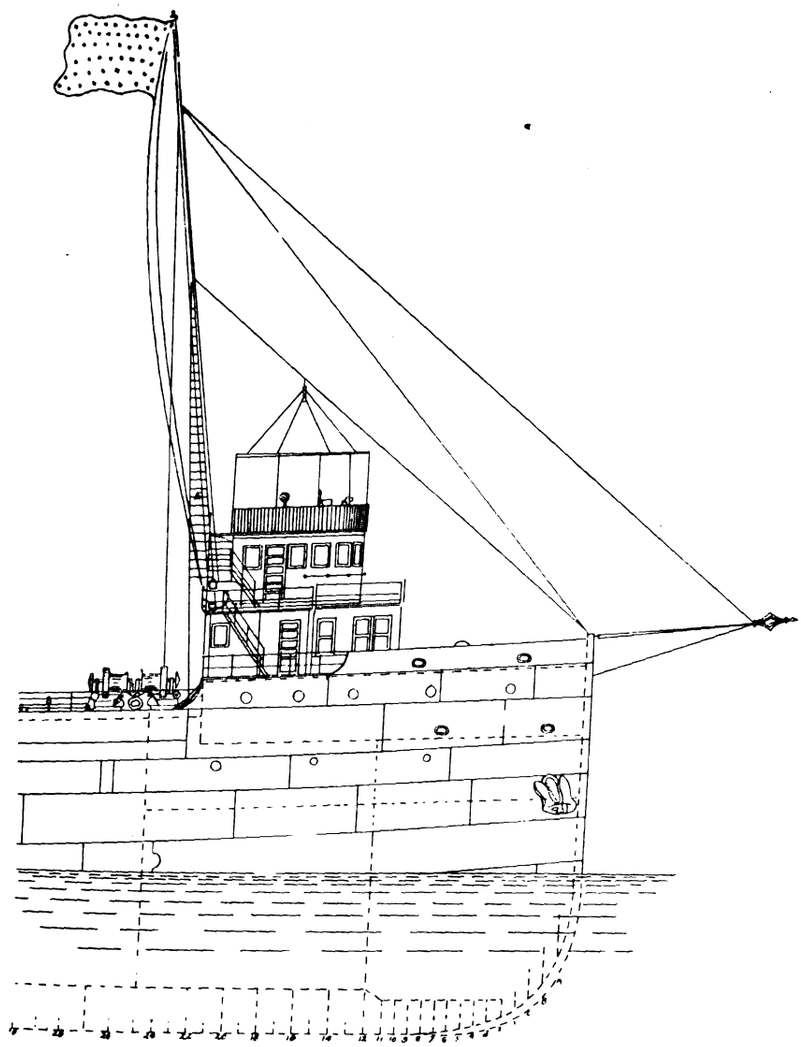
out similarly to the after deck house ends. Fig. 133 is the starboard side of the forward deck house and Fig. 134 the port side which are laid out by the same process as Figs. 122 and 123 of the after house.



— Fig. 120 —

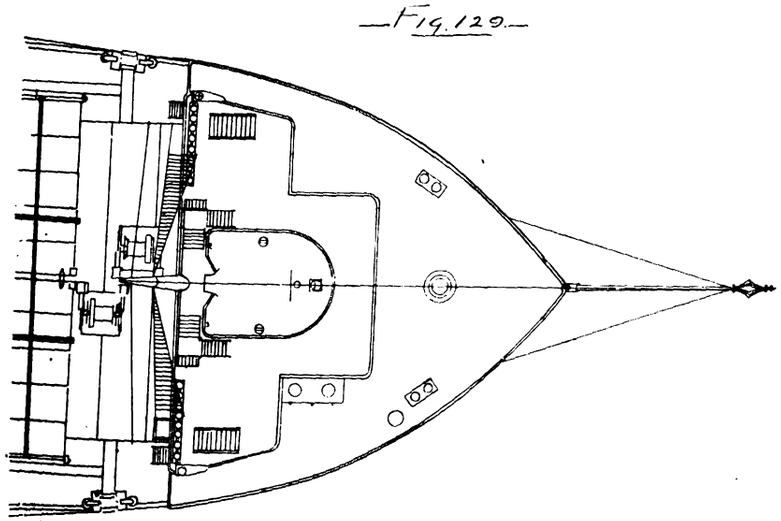
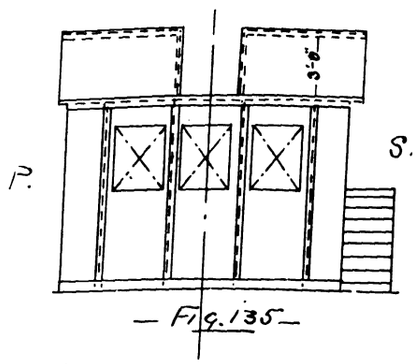


Fig. 135 shows the after end of the pilot house and Fig. 136 the port and starboard sides of same. The foundation angle is shown on the top of the fore house for the pilot house and represents the bottom of end and sides of the pilot house, Figs. 135 and 136. The process of laying off these sides is similar to the other parts of the houses under same and at the after end. Fig. 137 shows the plan of the top of the pilot house which is laid off similarly to the other house tops.

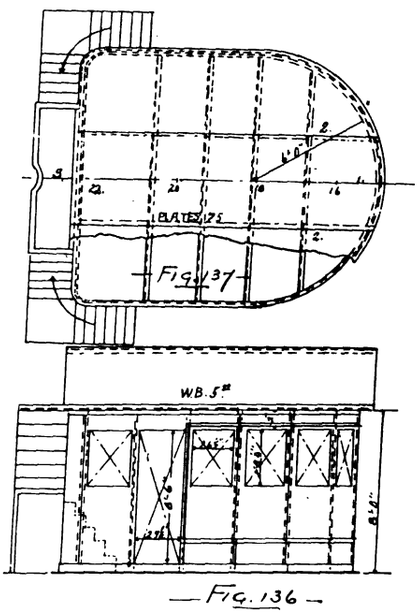
The pilot house is sometimes put together on the ground and riveted up so that the wood work can be gone on with. The wood work for the houses in the meantime is gone on with and is ready to be put in place when the steel work is finished.



— Fig. 135 —

The process of doing this work in Scotland would be to line in the bottom of the house after the deck plating was put on inway of same.

On the bottom angle line all the butts of the plates for the sides and ends of the house, door openings and location of beams would be nicked in on the deck. All these marks are transferred onto the template when copying the holes from the deck for the bottom angle of house. On the standing flange these marks are guides for getting the holes in the proper places.



— Fig. 137 —

— Fig. 136 —

Fig. 120 shows how the bottom angle would look when punched and erected in place.

To get the sides and ends of the

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house, Figs. 122, 123, 124 and 125, templates would be made for the plates between the openings for the doors.

Fig. 122 shows three doors in this case, five templates would be made and all the sides of doors plumbed as well as the butts of plates.

Fig. 123 shows five doors and in this case six templates would be made and all the doors and butts of plates located on same. Fig. 124 has no doors so that the whole side with the exception of the corner plates, No. 4, would be templated in one piece copying the plate butts on same and getting on a plumb line. Fig. 125 shows only one door, in this case a template would be made from the side of the door to side of house taking in five plates, viz.: 24, 25, 26, 27 and 28. All these plates are laid down in a convenient

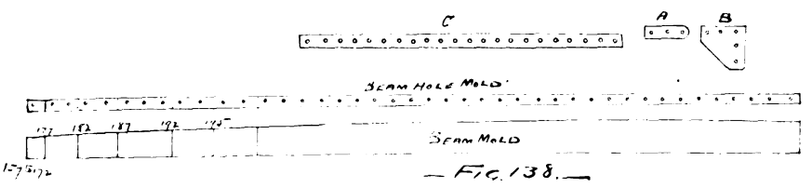

FIG. 138.

place and the marks copied from the templates after which the plates are punched and erected in place.

The top angle is then put on binding the sides of house plating together which are up in place.

The plates at the corners of the houses and tops of doors are then completed.

The stiffeners are punched, being marked from a mold C, Fig. 138. The pilasters are all marked from the ship but the beams and brackets are marked from molds, Fig. 138. The beam mold, Fig. 138, shows some widths as numbered.

The beam hole mold, Fig. 138, has the beam lengths marked upon it as shown by dotted lines and to get the shape of the end of the beam which stands plumb or parallel to the center line a bevel is used. The bevel is applied to the beam mold and the line transferred to the beam angle after which the mold A, Fig. 138, is applied to same the round end of mold being applied to the cutting line of beam. The same mold is applied to the top of the stiffener the round part being held to the top of stiffener or deck line.

During the laying out of the sides of the house the beams and stiffeners are gone on with and when the pilasters are on the stiffeners are bolted up on the opposite side after which the beams and brackets are bolted to the stiffeners. Before riveting the sides stout timbers are bolted to the plating lengthwise which keeps the house nice and fair.

The top of the house is all marked from the ship after the beams are in place and faired up with braces and shores.

All the houses are treated similarly. Cost of marking, punching, beveling, bending and erecting houses, 600 dollars in Scotland and half of same on the lakes.

TOWING BUSINESS ON THE LAKES.

The Great Lakes Towing Co. recently received from abroad on inquiry concerning the methods of conducting the towing business on the great lakes. The reply of the company was so much to the point as to be quite as interesting to great lakes concerns as to the European correspondent, as it gives a very faithful picture of the business and shows the evolution through which it is now passing.

"The Great Lakes Towing Co. directly and through its subsidiary companies, own and operate about 100 tugs. These tugs are stationed at twenty ports between Duluth, at the western end of Lake Superior and Buffalo, at the eastern end of Lake Erie. These tugs are used principally for the purpose of assisting boats to their docks, in and out of harbors, and to relieve boats that are stranded or wrecked. In addition to the tugs, we also own and operate lighters and other wrecking outfit, for the purpose of releasing boats that are stranded, and raising those that are sunk. Our new lighters are built of steel, with a carrying capacity of about 1,500 net tons, and are equipped with a steam crane with clam-shell bucket—capable of handling about 100 tons of ore or coal per hour without labor other than two or three men who operate the machinery.

The most of our tugs are what are known as the harbor type, having small hulls and houses and large power. This is necessary in order to enable them to work in close quarters in the rivers and about the docks.

"Many of the new steamers of the Great Lakes are 600 feet long, and have a carrying capacity of 12,000 to 14,000 net tons. The tugs are employed to tow these vessels from the lake into the harbors and place them at the docks. In some of the harbors the docks are several miles up the rivers, which are very narrow, being only wide enough to permit two or three boats to pass each other at a time, and in most cases the rivers are very crooked and are crossed by a great many bridges.

"Up to within a few years nearly all of the tugs have been constructed of wood. We are, however, now doing away entirely with wooden construction, and building our hulls entirely of steel. We have found the cost of maintaining wooden hulls very expensive, and have been obliged to rebuild on an average of every seven to ten years.

"The change in the class of boats employed on the great lakes during the last ten years has necessitated our abandoning the use of a great many small tugs, and acquiring a great many large ones, so that the actual depreciation is difficult to determine.

"A tug that is not called upon to go away from its home port, and operates for short service which will not average over eight or ten hours out of twenty-four carries a crew consisting of a captain, engineer and two men who act as fireman and deck hand, also a cook. Tugs which are required to go some distance from home, or operate the greater part of the twenty-four hours, have crews double the number of the single crew.

"It is difficult to give you a very intelligent idea of the cost of towing, as there is such a variety of boats and conditions. It costs, approximately, $40.00 per day to operate a tug on the great lakes with a single crew—working on an average of eight hours out of the twenty-four, at such times during the twenty-four hours as the business may offer. Practically all of our wrecking work and assistance to boats stranded, or in distress, is done at a fixed per diem rate for tugs, lighters and other outfit, and we seldom demand salvage for relief to a boat in trouble. We have found it more satisfactory to get a fair price all of the time and keep the confidence and good will of the owners, rather than to attempt to exact all that we might legally claim on the salvage basis.

"We do not make a practice of towing boats from one port to another for the purpose of transporting cargoes. There is some of this towing done by steamboats which also carry cargoes. This is, however, a practice that is being abandoned, and all of the new boats have self-propelling

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power. When this is done, it is the custom for the boat towed to pay the steamer doing the towing one-third of its freight. On ore the average freight this season—from Duluth to ports on Lake Erie—is 75 cents per gross ton. This is a distance of about 900 miles, so that the steamer receives 25 cents per gross ton of cargo carried for towing this distance with cargo and return light. Should the boat carry a cargo of coal on its return trip, it would receive about 40 cents per net ton, and the steamer would also get one-third of this."

WRECKER FAVORITE BURNED.

The wrecking steamer Favorite was destroyed by fire on Friday last. Among vessel men this event attracted more attention than would be ordinarily accorded to a vessel of equal value, due to the fact that she was personally known to all of them. As a wrecking steamer the Favorite had led an unusually active life and was practically engaged in all of the leading expeditions on the lakes for several years past. She was not, however, always a wrecker. Originally the Favorite was a passenger steamer and was built at Fort Howard, Wis., in 1864. She was 140 ft. long, 29 ft. beam and 8 ft. deep, and operated between Marquette and Hancock. Later she changed hands and fell into the prosaic business of towing, being used to tow barges between Georgian Bay ports and Chicago. In 1889 she was acquired by the Swain Wrecking Co., in which A. A. Parker and B. W. Parker, of Detroit, were associated, and she was converted into a wrecker with Capt. Martin Swain in charge. After she was acquired by the Great Lakes Towing Co. Capt. Alex Cunning took charge of her and was very successful in his management of her at several important wrecks. Her equipment of pumps and other machinery was among the best on the lakes. The Great Lakes Towing Co. is now building at Buffalo a wrecker from designs by Mr. W. L. Babcock, of New York, which will be far in advance of any similar boat now on the lakes. She will replace the Favorite and will be named in honor of her.

LAUNCHING THE M. ANDREWS.

The freighter M. Andrews was launched at the Cleveland yard of the American Ship Building Co. for Henry Steinbrenner of Cleveland and was christened by Miss Marcella Andrews in honor of her father, who is a prominent member of the firm of M. A. Hanna & Co. The Andrews is a duplicate of the steamer D. R. Hanna which came out late last fall. She is therefore 552 ft. over all, 532 ft. keel, 56 ft. beam and 32 ft. deep, having triple-expansion engines with cylinders 23½, 38 and 63 in. diameters by 42-in. stroke, supplied with steam from two Scotch boilers, 14½ ft. diameter and 11½ ft. long, equipped with Ellis & Eaves draft and allowed 180 pounds pressure. The launching partly was unusually large. Capt. Jos. Lampoh will bring the Andrews out next season, and W. H. Miller will be her chief engineer.

AN IMPORTANT DECISION.

The United States circuit court of appeals at Chicago decided a case which is important to all marine interests. The schooner Emily B. Maxwell, on Sept. 11, 1900, took on a cargo of hardwood lumber at East Jordan in Pine Lake, and towed to Charlevoix. There was displayed there by the weather bureau a signal predicting a storm, and a bulletin was posted in the office saying that it was dangerous for all vessels to leave port. The master of the Maxwell saw the storm signal, but did not examine the bulletin and left port. In about five hours afterwards he was overtaken by a northwest gale, which caused the vessel to lose her deck load, besides damaging her sails, etc.

The owner of the cargo brought suit against the schooner to recover the loss of the deck load, alleging the master was negligent in leaving port in the face of the storm signal and bulletin. The case was tried and the district court held that the owner of the cargo was entitled to recover. An appeal was taken and the circuit court of appeals has just reversed this decision and holds that leaving port was a part of the navigation of the vessel and that the case was therefore within the Harter act and the owners were not liable.

The court holds that navigation includes the time and manner of leaving, the course to be taken and the sail to be carried, so that even though a master disregards a storm signal and bulletin and sails in the face of these, the owner is not liable for the master's acts in that regard under the terms of the Harter act. Attorney C. E. Kremer represented the Maxwell.

Now that navigation is closed, the port of Ashtabula has undergone a great change, where before the buzz of machinery, the tooting of naphtha launches and the whistling of incoming freighters made things hum, now all is quiet. The stores close at six o'clock and a man can go the whole length of Bridge street without meeting anyone. Many of the leading men at the harbor are getting things in shape to hike to the south.

COAL SHIPMENTS FROM BUFFALO.

Brown & Co., of Buffalo have compiled for the MARINE REVIEW the total shipments of anthracite coal by the various coal shippers from Buffalo by water during the season of 1906. These figures are absolute and are the only authentic figures on hard coal shipments published. The figures show that a total of 2,838,843 tons were shipped and distributed as follows:

Port Arthur	22,509.07
Fort William	81,520.06
Duluth	408,868.00
Superior	358,037.00
Washburn	4,391.10
Houghton	9,499.17
Hubbel	8,030.10
Ashland	27,008.16
De Pere	4,017.09
Torch Lake	3,031.17
Hancock	25,851.15
Lake Linden	2,645.09
Marquette	21,456.19
Escanaba	19,199.01
Menominee	2,552.10
Marinette	4,043.14
Gladstone	7,702.14
Green Bay	72,401.15
Manistique	1,520.19
Two Rivers	1,045.09
Kewanee	1,590.08
Manitowoc	16,114.11
Grand Marais	221.15
Sheboygan	164,745.00
Port Washington	1,091.18
Sturgeon Bay	1,320.02
Milwaukee	734,311.04
Racine	34,424.04
Kenosha	11,317.12
Waukegan	81,824.19
Chicago	636,741.06
Manistee	974.08
Mackinac	710.16
St. Ignace	421.02
Sandwich	528.13
Muskegon	1,788.08
Cheboygan	1,183.17
Traverse City	1,179.07
Sault Ste. Marie, Mich.	24,840.10
S. S. Marie, Ont.	3,174.02
Petosky	1,140.02
Sarnia	1,877.02
Au Sable	174.14
Alpena	1,032.13
Marine City	1,202.10
Bay City	8,376.10
Algonac	1,037.02
Kelley Island	408.16
Port Huron	2,735.01
St. Clair	680.19
Detroit	2,112.00
Windsor	2,004.00
Ludington	1,480.13
Toledo	23,373.00
Amherstburg	860.03
Parry Sound	2,260.02
Port Sanilac	250.10
Byng Inlet	138.18
Penetang	244.03
Dollar Bay	874.14
	2,838,843.01

Capt. P. L. Miller, of the Hanna fleet, has returned to his home at Romeo, after laying his boat up at this end of the line. He will return in a month or so to look after his boat.

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January 17, 1907.

SHIPPING BILL APPROVED.

The house committee on merchant marine and fisheries decided this week by a vote of eight to seven to make a favorable report on the shipping bill prepared by Representative Littauer, of New York, as a substitute for the Grosvenor bill passed by the senate at the first session of the present congress. The bill provides for seven fixed mail lines to South America and the Orient but eliminates the cargo provision. While this bill is not much, certainly not as much as the American merchant marine deserves, any bill is nevertheless better than no bill at all. Things looked pretty black in Washington last week for any aid to shipping whatever from the house, but the tide was turned by the energetic efforts of Mr. Harvey D. Goulder, president of Merchant Marine League of the United States, and a delegation of men from the middle west. There is reason to believe that the bill will be placed immediately upon the calendar and submitted for passage. If any measure on earth deserves to be passed, it is this shipping bill. The United States is practically cut off from one of its largest markets by reason of inadequate lines of transportation. South America is an empire in itself with enormous consuming capacity, and yet American products have to reach it in British ships. The result is that our trade with South America is not a tithe of what it should be. This bill will, if passed, lame as it is, prove the possibilities of adequate aid. It will, however, do little more than point the way.

FIRE PROTECTION ON LAKE STEAMERS.

The impending annual meeting of the Board of Supervising Inspectors of Steam Vessels serves to call attention to some of the existing rules which urgently need clearing up and the advisability of amending others. The board is to be complimented on the thoroughness of their revision of the old rules on the greatly increased efficiency of the inspection service, in fact, the general verdict of owners, builders and officers is that we never had real inspection until within the past two or three years. As with all laws, however, the test of their value comes with the application and thus has developed the need of adjustment.

We will at this time confine our remarks to Rule IV covering fire apparatus and its application to lake steamers in particular. Section 8 reads "Steamers required to be provided with double-acting steam fire pumps or equivalents for throwing water shall be equipped with such pumps, according to their tonnage, as follows," etc., etc. This section should be amplified to specify any distinction in class, as for instance as between freight and passenger steamers, and to cover any exceptions to the general rule in each case.

The rule as it stands brings every steamer under its operation, regardless of employment, or type of construction. For example, the large passenger steamers Eastern States and Western States having a gross tonnage of about 3,000, have, under the rule, no greater or better fire protection than the ore carrier of an equal tonnage where there is practically nothing to burn and where a bonfire could be kindled on almost any part of the ship without affecting her safety or that of her crew. This is not as it should be, either one ship has too much protection or the other not enough; we think the general opinion will incline to the latter view.

Again, the same section provides that "Steamers under 3,000 tons shall have not less than one-third (1-3) of one (1) cubic inch pump cylinder capacity for every gross ton." This clause is urgently in need of classification since the word "capacity" may be interpreted in several ways.

The engineering definition would be quantity or volume of discharge in a given time, usually one minute, and thus a certain piston speed would have to be established as a basis. Another definition would cover merely the volume of pump cylinder, or, area of plunger by stroke in inches. This definition, however, has never been accepted since it would demand a pump much larger than permitted by the third definition which has been generally acted upon and which assumes that the capacity is the volume displaced during one revolution or two strokes.

Certainly it was not the intention of the board to leave this question open to debate, as it has become in several instances, owing to the absence of a ruling on the subject. For instance the three definitions give us for a steamer, let us say just under 3,000 tons, the following based on $\frac{3000}{3}$ = 1,000 cu. in. capacity.

(1) Assume piston speed 150 ft. per minute, 150 × 12 = 1,800 in. per minute; $\frac{1000}{1800}$ = plunger area 0.6 in.

(2) Area × stroke in inches $\frac{1000}{2}$ = 500 = duplex 7½ in. × 12 in. or single 8 in. × 20 in. or equivalent.

(3) Area × stroke × 2 = duplex

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5¼ in. × 12 in. or single 8 in. × 10 in. or equivalent.

It is perfectly obvious that (1) is not contemplated. The exigencies of service aboard the freighter make it necessary to employ pumps which comply with (3) although this, of course, is only incidental and is not to be taken into consideration in framing a rule.

While it is fairly reasonable that the steel freighter of over 3,000 tons should not be required to be equipped with pumps of greater capacity than (3) it is not reasonable that this rule should include passenger ships. The new steamer for the D. & C. line, for instance, will probably ton in the neighborhood of 5,000, her berthing and excursion capacity will be nearly 50 per cent greater than that of the Eastern or Western States and yet under any interpretation of the rule the capacity of fire pumps need be no greater. It is perfectly obvious therefore that the rule is not logical. We cannot in the space available undertake to discuss possible solutions but the case presents no difficulties that cannot be readily met.

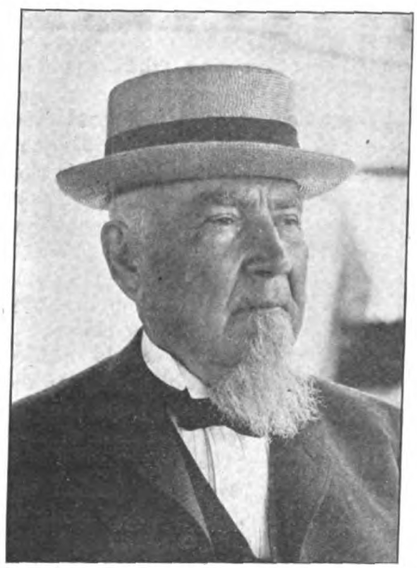
Section 10 is also the subject of debate in that it is not clear whether the size of each branch and hose shall be equal to the discharge opening of the pump or the aggregate of branches and hose.

If the former then it is probable that no steamer on the lakes, certainly not in the freighter class, complies with the law, if the latter then the rule is almost valueless since it is quite possible that a fire might have to be fought with one or two branches. Moreover there is no well-established practice as regards ratio of discharge opening to actual pump capacity, this being a matter each pump builder decides for himself arbitrarily.

Section 11 should be eliminated from the rules since it presupposes a mechanical impossibility and introduces an opportunity for at least attempted evasion. To sum up it should not be difficult to frame a rule that would differentiate between freight and passenger steamers and in the latter case base the pump capacity upon the number of passengers allowed by excursion permit the capacity to be further checked by tonnage and embodying a definite piston speed of pump which would eliminate any question as to the meaning of the term "capacity."

OBITUARY.

In the death of Thomas Adams, of Detroit, the lakes lost one of its sterling characters. Born in Somerset, England, March 11, 1832, Mr. Adams came to America when fourteen years old and had lived in Detroit since 1848 continuously. He learned the brass molders' trade in the shops of



THOMAS ADAMS.

DeGraff & Kindrick and later became associated with the old Detroit Locomotive Works. In the early 60's he became interested with Capt. R. J. Hackett and John Strachn in the vessel and tug business. He was also associated with Thomas S. Christie and the late Samuel F. Hodge in the old towing association. In 1879 in association with Jesse H. and George Farwell he built the largest steamer on the lakes, the Tom Adams. She was later renamed Langham. This partnership continued until 1895 when Mr. Farwell retired. Mr. Adams then became associated with Mr. John Craig, of Toledo, and the steel steamers Thomas Adams and George L. Craig were built at the Craig yard for the Monroe Transportation Co. and the Adams Transportation Co., of which Mr. Adams was treasurer and manager. Mr. Adams is survived by only one son, John I. Adams.

James Crockett, an old marine engineer, died at Detroit recently. He was born in Scotland eighty-four years ago, and had lived in Detroit for more than half a century. At one time he was chief engineer of the old City of Detroit, now City of the Straits.

Mr. B. L. Pennington, formerly a prominent vessel owner, died at his home in Cleveland on Tuesday He was born at Gap, Lancaster county, Pa., on March 23, 1837. He served throughout the Civil war as a member of the 150th Ohio Volunteers. In 1865 he became a ship broker with J. H. Palmer, under the firm name of Palmer & Pennington. He later retired from this partnership and formed one with the late Capt. Thomas Wilson, owning several of the largest wooden vessels on the lakes, including the steamer C. B. Lockwood and the schooner B. L. Pennington. In 1883 he retired from active association with lake traffic and entered the firm of Lockwood, Taylor & Co., wholesale hardware dealers.

Capt. Joseph Powell, master of the steamer G. J. Grammer, died suddenly at Buffalo last Saturday, week, where he had laid up his boat. He had been ill for some time with typhoid fever at the Stafford hotel, and succumbed Saturday. Capt. R. W. England brought the body to Amherstburg, the deceased's old home. No master on the lakes had more friends than Capt. "Joe" Powell, as he was generally known. He ran away from home when only a lad to go sailing on tugs and later commanded the River Queen, now out of existence. For seven years he sailed the Fayette Brown and the G. J. Grammer was his command for three years. Though but thirty-eight years of age, Capt. Powell belonged to the "old guard" of Amherstburg mariners. He knew steamboating as only the old sailors do and had a brilliant record.

The passenger traffic department of the Consolidated Steamship Lines including the Clyde Steamship Co., Mallory Steamship Co., Metropolitan Steamship Co., outside all water route between New York and Boston, Eastern Steamship Co., Peoples' Line, between New York and Albany, and Citizens' Line between New York and Troy, has been removed from Pier 32 North river to Room 814 Dun building, 290 Broadway, corner Reade street, where the passenger traffic affairs of the companies mentioned will be conducted in the future.

Mr. Jay Amsden, superintendent of the Hanna docks at Ashtabula, is figuring on going south for part of the winter season.

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Lake Launchings For Five Years Past.

During 1906 the ship building of the great lakes, exclusive of the Canadian yards, launched forty-seven vessels, of which forty were bulk freighters, two passenger steamers, two package freighters, two car ferries and one car ferry. These twenty-nine bulk freighters have 260,200 gross tons carrying capacity on a single trip or 5,204,000 gross tons in an average season of twenty trips.

During 1904 lake ship yards launched fifty vessels of which forty-two were bulk freighters, five car ferries and three passenger steamers. These forty-two bulk freighters have a carrying capacity of 213,250 tons on a single trip or 4,265,000 tons in an average season of twenty trips. It should be stated, however, that ten of these freighters were built by Mr. Wolvin for St. Lawrence river trade and are actively engaged in that service, but as they are available for the ore trade, they have been classed as bulk freighters with an average capa-

sand dredge. The forty bulk freighters have a carrying capacity of 381,000 tons on a single trip or 7,620,000 gross tons in an average season of twenty trips.

During 1905 the ship builders of the great lakes launched thirty-two steamers, of which twenty-nine were bulk freighters, two package freighters, and launched thirteen vessels of which seven were bulk freighters, two package freighters, one car ferry and three passenger steamers. The seven bulk freighters have a carrying capacity of 51,300 tons on a single trip or 1,026,000 in an average season of twenty trips.

During 1903 lake ship yards

VESSELS LAUNCHED ON THE GREAT LAKES DURING 1905.

AMERICAN SHIP BUILDING CO., CLEVELAND, O.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Lorain	Freighter	Joseph Sellwood	545	10,000	Capt. John Mitchell, Cleveland.
Wyandotte	Freighter	E. D. Carter	524	9,000	E. D. Carter, Erie, Pa.
Cleveland	Freighter	Charles S. Hebard	524	9,000	Wilson Transit Co., Cleveland.
Lorain	Freighter	Loftus Cuddy	545	10,000	Capt. John Mitchell, Cleveland.
W. Superior	Freighter	Abraham Stearn	545	10,000	W. A. Hawgood, Cleveland.
Cleveland	Freighter	David Z. Norton	500	8,000	Capt. W. C. Richardson, Cleveland.
W. Bay City	Freighter	John Sherwin	534	9,500	Gilchrist Transp. Co., Cleveland.
Wyandotte	Freighter	Harry Coulby	569	11,000	Smith Transp. Co., Syracuse, N. Y.
Lorain	Freighter	Harvey D. Goulder	545	10,000	Henry A. Hawgood, Cleveland.
S. Chicago	Freighter	J. Pierpont Morgan	600	12,000	Pittsburg Steamship Co., Cleveland.
Cleveland	Pkg. Frtr.	Ogdensburg	256	3,000	Rutland Transit Co., Ogdensburg, N. Y.
Lorain	Freighter	Henry B. Smith	545	10,000	W. A. & A. H. Hawgood, Cleveland.
Wyandotte	Pass. Str.	Brittania	189	——	Detroit, B. I. & Windsor Ferry Co., Detroit.
Cleveland	Pkg. Frtr.	Rutland	256	3,000	Rutland Transit Co., Ogdensburg, N. Y.
Wyandotte	Freighter	Sir Thos. Shaughnessy	500	8,000	C. O. Jenkins, Cleveland, O.
W. Superior	Freighter	E. J. Earling	545	10,000	H. K. Oakes, Detroit, Mich.
W. Bay City	Freighter	Charles Weston	569	11,000	Tonawanda Transit Co., N. Tonawanda, N. Y.
S. Chicago	Freighter	Henry H. Rogers	600	12,000	Pittsburg Steamship Co., Cleveland.
Cleveland	Freighter	Wm. G. Pollock	430	6,500	W. H. Becker, Cleveland, O.
Lorain	Freighter	J. O. Riddle	552	10,000	A. H. Howgood, Cleveland, O.
Wyandotte	Freighter	Joshua Rhoades	430	6,500	W. H. Becker, Cleveland, O.
Lorain	Freighter	A. Y. Townsend	602	12,000	Cambria Steel Co., Philadelphia.
Superior	Freighter	Norman B. Ream	600	12,000	Pittsburg Steamship Co., Cleveland.
Bay City	Freighter	Henry A. Hawgood	552	10,000	W. A. & A. H. Hawgood, Cleveland, O.
S. Chicago	Freighter	Wm. E. Fitzgerald	430	6,500	Capt. Dennis Sullivan, Chicago.
Cleveland	Car ferry	Ann Arbor No. 4	279	——	Ann Arbor Railway.
Wyandotte	Freighter	D. R. Hanna	552	10,000	Pioneer Steamship Co., Cleveland.
Cleveland	Freighter	Peter A. B. Widener	600	12,000	Pittsburg Steamship Co., Cleveland, O.
Lorain	Freighter	James S. Dunham	430	6,500	Capt. Dennis Sullivan, Chicago.
S. Chicago	Freighter	D. J. Morrell	602	12,000	Cambria Steel Co., Philadelphia.
Bay City	Freighter	Samuel Mather	550	10,000	Pickands, Mather & Co., Cleveland.
W. Superior	Freighter	Sheldon Parks	552	10,000	W. A. & A. H. Hawgood, Cleveland, O.
Lorain	Freighter	James F. Morrow	430	6,500	Joseph Sellwood, Duluth, Minn.
Bay City	Freighter	Gen. Garretson	540	10,000	Gilchrist Transportation Co., Cleveland.
S. Chicago	Freighter	W. B. Kerr	605	12,000	Weston Transportation Co., Tonawanda, N. Y.

GREAT LAKES ENGINEERING WORKS, DETROIT, MICH.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Ecorse	Freighter	William P. Snyder	550	10,000	Shenango Steamship Co., Cleveland.
Ecorse	Freighter	James Laughlin	550	10,000	Jones & Laughlin Steel Co., Pittsburg.
St. Clair	Car Ferry	Ashtabula	350	30 Cars	J. W. Ellsworth & Co., Cleveland
Ecorse	Sand Dredge	John M. McKerchey	170	——	John McKerchey, Detroit, Mich.
Ecorse	Freighter	Michigan	550	10,000	Cleveland-Cliffs I. Co., Cleveland.
Ecorse	Freighter	Ishpeming	550	10,000	Cleveland-Cliffs I. Co., Cleveland.
Ecorse	Freighter	E. L. Wallace	415	7,000	Dearborn Transit Co., Detroit.
Ecorse	Freighter	J. H. Sheadle	550	10,000	Cleveland-Cliffs I. Co., Cleveland.
St. Clair	Freighter	John Mitchell	440	6,500	Charles W. Elphicke, Chicago.

TOLEDO SHIP BUILDING CO., TOLEDO, O.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Toledo	Freighter	Eugene Zimmerman	500	8,000	L. S. Sullivan, Toledo, O.
Toledo	Pass. Str.	Theodore Roosevelt	289	——	Indiana Transp. Co., Chicago, Ill.
Toledo	Freighter	Sierra	458	7,500	Interocean Nav. Co., Duluth.

CANADIAN SHIP BUILDING CO., TORONTO, ONT.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Toronto	Pass. Str.	Cayuga	317½	——	Niagara Navigation Co., Toronto

COLLINGWOOD SHIP BUILDING CO., COLLINGWOOD, ONT.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Collingwood	Freighter	Midland Prince	486	8,000	Midland Nav. Co., Midland, Ont.

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VESSELS LAUNCHED ON THE GREAT LAKES DURING 1905.

AMERICAN SHIP BUILDING COMPANY'S YARDS.

Where Built	Type.	Name of Vessel.	Length over-all ft.	Carrying Capacity.	Name and address of owner.
Cleveland	Freighter	Francis L. Robbins	400	6,000	Robbins Transportation Co., Cleveland.
Lorain	Freighter	James C. Wallace	552	16,000	Acme Steamship Co., Duluth.
Lorain	Freighter	Philip Minch	500	8,000	Henry Steinbrenner, Cleveland.
West Bay City	Freighter	Sylvania	524	9,000	Duluth Steamship Co., Duluth.
Wyandotte	Freighter	Amasa Stone	545	10,000	Pickands, Mather & Co., Cleveland.
Cleveland	Freighter	L. C. Hanna	524	9,000	Mahoning Steamship Co., Cleveland.
Chicago	Freighter	E. H. Gary	569	10,000	Pittsburg Steamship Co., Cleveland.
Lorain	Freighter	S. M. Clement	500	9,000	Buffalo & Susquehanna Steamship Co., B'flo.
West Bay City	Freighter	Socapa	524	9,000	Duluth Steamship Co. Duluth
Wyandotte	Freighter	Lyman C. Smith	545	10,000	United States Transportation Co., Syracuse.
Chicago	Freighter	W. E. Corey	569	10,000	Pittsburg Steamship Co., Cleveland.
Cleveland	Freighter	W. A. Paine	500	8,000	C. L. Hutchinson, Cleveland.
Lorain	Freighter	W. A. Rogers	545	10,000	Niagara Transit Co., N. Tonawanda.
Wyandotte	Freighter	Powell Stackhouse	524	9,000	Mahoning Steamship Co., Cleveland.
West Bay City	Freighter	H. C. Frick	569	10,000	Pittsburg Steamship Co., Cleveland.
Cleveland	Car ferry	Bessemer & Marquette No. 2	350	Car f'ry.	Marquette & Bessemer Dock Navigation Co., Conneaut, O.
Lorain	Freighter	John Stanton	524	9,000	C. L. Hutchinson, Cleveland.
Lorain	Freighter	Joseph G. Butler Jr.	545	10,000	C. L. Hutchinson, Cleveland.
Cleveland	Freighter	Pendennis White	436	6,500	Capt. John Mitchell, Cleveland.
Wyandotte	Freighter	W. K. Bixby	500	8,000	National Steamship Co., Detroit.
West Bay City	Freighter	James B. Wood	534	9,500	Gilchrist Transportation Co., Cleveland.

GREAT LAKES ENGINEERING WORKS.

Where built.	Type.	Name of Vessel.	Length over-all ft.	Carrying Capacity.	Name and address of owner.
Ecorse	Freighter	James E. Davidson	524	9,000	Interocean Steamship Co., Duluth.
St. Clair	Freighter	George H. Russel	484	7,600	Gilchrist Transportation Co., Cleveland.
Ecorse	Freighter	Hoover & Mason	524	9,000	Zenith Steamship Co., Duluth.
Ecorse	Pkg. Frtr.	Superior	408	6,000	Western Transit Co., Buffalo.
Ecorse	Freighter	Peter White	524	9,000	Presque Isle Transportation Co., Cleveland.
St Clair	Freighter	Frank J. Hecker	484	7,600	Gilchrist Transportation Co., Cleveland.
Ecorse	Freighter	W. G. Mather	531	10,000	Cleveland-Cliffs Iron Co., Cleveland.
Ecorse	Pkg. Frtr.	Delaware	370	5,000	Erie & Western Transit Co., Buffalo.
Ecorse	Freighter	Frank C. Ball	550	10,000	Globe Steamship Co., Duluth.
Ecorse	Freighter	B. F. Jones	550	10,000	Jones & Laughlin Steel Co., Pittsburg.

CRAIG SHIP BUILDING CO.

Where Built.	Type.	Name of Vessel.	Length over-all ft.	Carrying Capacity.	Name and address of owner.
Toledo	Freighter	James P. Walsh	500	8,000	C. O. Jenkins, Cleveland.

VESSELS LAUNCHED ON THE GREAT LAKES DURING 1904.

AMERICAN SHIP BUILDING CO., CLEVELAND, O.

Where built.	Type.	Name of Vessel.	Length over-all. ft.	Carrying Capacity.	Name and address of owner.
Cleveland	Freighter	Umbria	440	6,800	H. A. Hawgood, Cleveland, O.
S. Chicago	Pass. Str.	Missouri	260	———	Northern Mich. Transp. Co., Chicago.
Cleveland	Freighter	Francis Widlar	436	6,750	Columbia Steamship Co., Cleveland.
Lorain	Freighter	Augustus B. Wolvin	569	10,000	A. B. Wolvin, Duluth, Minn.
Wyandotte	Pkg. Frtr.	Utica	345	4,800	Western Transit Co., Buffalo, N. Y.
Lorain	Freighter	Sahara	494	8,000	G. A. Tomlinson, Duluth, Minn.
Cleveland	Freighter	Martin Mullen	436	6,750	Capt. Charles Hutchinson, Cleveland.
Cleveland	Pkg. Frtr.	Juniata	360	5,000	Anchor Line, Buffalo, N. Y.
Lorain	Freighter	Ball Brothers	500	8,000	G. A. Tomlinson, Duluth, Minn.

GREAT LAKES ENGINEERING WORKS, DETROIT, MICH.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Detroit	Freighter	R. W. England	376	5,000	Frank Seither, Cleveland, O.
Detroit	Car ferry	Detroit	308	———	Mich. Central R. R.

CRAIG SHIP BUILDING CO., TOLEDO, O.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Toledo	Pass. Str.	City of Benton Harbor	265	———	Graham & Morton Transp. Co., Chicago.
Toledo	Pass. Str.	Indianapolis	200	———	Indiana Transp. Co., Mich. City, Ind.

BERTRAM ENGINE WORKS, TORONTO, ONT.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Toronto	Pkg. Frtr.	Hadington	254	2,300	Matthews Line, Toronto, Ont.
Toronto	Car ferry	Tom Fawcett	133	———	Wolfe Island Township.

city of 3,000 tons each on 18 ft. draught.

During 1902 the lake ship yards launched forty-one vessels, of which thirty-two were bulk freighters (two of them barges), two passenger steamers, three package freighters, two car ferries and two vessels for salt water service. These thirty-two bulk freighters have a carrying capacity of 171,910 tons on a single trip or 3,438,200 tons in an average season of twenty trips.

During the past five years, therefore, ships having a carrying capacity of 21,553,200 gross tons in a full season have been added to the lake fleet. This is equivalent to the total movement of ore during the year 1904. Moreover there are now on the stocks for 1907 delivery, exclusive of Canadian yards, forty-two bulk freighters with a carrying capacity on a single trip of 281,000 tons or 5,620,000 tons in a full season.

The particulars of vessels launched will be found in the accompanying tables.

Mr. J. H. Burton, superintendent of the Angeline and Pittsburg coal dock interests at Ashtabula, has gone to Colorado to spend the winter on a ranch he owns there.

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VESSELS LAUNCHED ON THE GREAT LAKES DURING 1903.

AMERICAN SHIP BUILDING CO., CLEVELAND, O.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Buffalo	Freighter	James S. Keefe	255	2,200	Great Lakes & St. Lawrence Transportation Co., Chicago.
Cleveland	Freighter	W. H. Mack	374	5 000	Mack Estate, Cleveland, O.
Lorain	Freighter	Hurlburt W. Smith	434	6,200	W. W. Brown, Cleveland, O.
West Bay City	Freighter	Sinaloa	436	6,200	G. A. Tomlinson, Duluth, Minn.
Buffalo	Freighter	Robert Wallace	255	2,200	Great Lakes & St. Lawrence Transportation Co., Chicago.
Cleveland	Freighter	Anna C. Minch	400	5,600	Kinsman Transit Co., Cleveland.
Lorain	Freighter	Monroe C. Smith	400	5,600	W. W. Brown, Cleveland, O.
S. Chicago	Freighter	C. M. Warner	390	5,250	U. S. Transportation Co., Cleveland.
Chicago	Freighter	John Lambert	255	2,200	Great Lakes & St. Lawrence Transportation Co., Chicago.
Lorain	Freighter	B. Lyman Smith	400	5,600	W. W. Brown, Cleveland, O.
W. Superior	Freighter	D. G. Kerr	468	6,900	Provident Steamship Co., Duluth.
Cleveland	Freighter	Saxona	436	6,200	G. A. Tomlinson, Duluth, Minn.
Superior	Freighter	John Sharpless	255	2,200	Great Lakes & St. Lawrence Transportation Co, Chicago.
Lorain	Freighter	Wilbert L. Smith	400	5,600	W. W. Brown, Cleveland, O.
S. Chicago	Freighter	John Crerar	255	2,200	Great Lakes & St. Lawrence Transportation Co., Chicago.
Wyandotte	Freighter	Albert M. Marshall	255	2,200	Great Lakes & St. Lawrence Transportation Co., Chicago.
Superior	Freighter	H. G. Dalton	255	2,200	Great Lakes & St. Lawrence Transportation Co., Chicago.
Superior	Freighter	D. M. Clemson	468	6,900	Provident Steamship Co., Duluth.
Lorain	Freighter	Louis Woodruff	436	6,200	Gilchrist Transp. Co., Cleveland.
Detroit	Freighter	A. D. Davidson	255	2,200	Great Lakes & St. Lawrence Transportation Co. Chicago.
Chicago	Freighter	Geo. C. Howe	255	2,200	Great Lakes & St. Lawrence Transportation Co., Chicago.
Detroit	Freighter	S. N. Parent	255	2,200	Great Lakes & St. Lawrence Transportation Co., Chicago.
Detroit	Freighter	James H. Reid	468	7,000	A. B. Wolvin, Duluth.
Bay City	Freighter	G. Watson French	376	5,000	C. W. Elphicke, Chicago.
Bay City	Freighter	Sonoma	436	6,500	G. A. Tomlinson, Duluth.
Bay City	Freighter	F. W. Gilchrist	436	6,500	J. C. Gilchrist, Cleveland.
Bay City	Freighter	J. L. Weeks	436	6,500	J. C. Gilchrist, Cleveland.
S. Chicago	Freighter	R. L. Ireland	436	6,200	Gilchrist Transp. Co., Cleveland.
Lorain	Freighter	R. F. Schuck	436	6,200	Gilchrist Transp. Co., Cleveland.
Buffalo	Freighter	P. P. Miller	375	4 900	Miller Steamship Co.
Wyandotte	Freighter	Western Star	435	6,200	Capt. M. J. Cummings, Oswego, N. Y.
Chicago	Freighter	Perry G. Walker	436	6,200	J. C. Gilchrist, Cleveland, O.
Lorain	Freighter	J. C. Gilchrist	436	6,200	Gilchrist Transp. Co., Cleveland.
Cleveland	Car ferry	Pere Marquette No. 19	350	———	Pere Marquette Railway Co.
W. Superior	Freighter	Henry S. Sill	436	6,200	Gilchrist Transp. Co., Cleveland.
Chicago	Pkg. Frtr.	Duluth	400	5,600	Western Transit Co., Buffalo.
Cleveland	Car ferry	Pere Marquette No. 20	350	———	Pere Marquette Co.
Buffalo	Steel collier	Marquette & Bessemer No. 1	255	———	Pere Marquette R. R. Co.
Superior	Freighter	Wisconsin	434	6,200	H. A. Hawgood, Cleveland, O.
Lorain	Freighter	Edwin F. Holmes	434	6.200	W. A. Hawgood & Co., Cleveland.
Wyandotte	Car ferry	Pere Marquette No. 14	350	———	Pere Marquette Railway

MANITOWOC DRY DOCK CO., MANITOWOC, WIS.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Manitowoc	Passenger	Chequamegon	112	———	Chequamegon Bay Transp. Co.

COLLINGWOOD SHIP BUILDING CO., COLLINGWOOD, ONT.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Collingwood	Freighter	Midland King	375	4,900	James Playfair, Midland, Ont.
Collingwood	Tug	Emerson	118	———	Montreal Transp. Co.

JENKS SHIP BUILDING CO., PORT HURON, MICH.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Port Huron	Pass. Str.	Eastland	279	———	Michigan S. S. Co., S. Haven, Mich.
Port Huron	Freighter	F. B. Squire	430	6,500	C. O. Jenkins, Cleveland.

COLUMBIA IRON WORKS, ST. CLAIR, MICH.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
St. Clair	Freighter	Winnebago	234	2,000	Iroquois Transp. Co., Chicago.
St. Clair	Freighter	John O. Howard	241	2,100	George Hall Coal Co., Ogdensburg.

BERTRAM IRON WORKS CO., TORONTO, ONT.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Toronto	Freighter	Tadousac	260	2,300	Waldie & Wright, Toronto, Ont.

CRAIG SHIP BUILDING CO., TOLEDO, O.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Toledo	Freighter	George L. Craig	404	5,600	Monroe Transp. Co., Detroit.
Toledo	Pass. Str.	City of South Haven	245	———	Dunkley-Williams Co., S. Haven, Mich.
Toledo	Car ferry	Grand Haven	315	———	Grand Trunk Ry.
Toledo	Freighter	Kensington	380	5,000	Kensington Transportation Co.

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VESSELS LAUNCHED ON THE GREAT LAKES DURING 1902.

AMERICAN SHIP BUILDING CO., CLEVELAND, O.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
S. Chicago	Freighter	A. G. Brower	366	4,800	U. S. Transp. Co., Cleveland.
Superior	Freighter	G. J. Grammer	366	4,800	Frank Seither, Cleveland, O.
Lorain	Freighter	E. M. Saunders	400	5,600	Gilchrist Transp. Co., Cleveland.
Cleveland	Freighter	W. H. Gratwick	436	6,200	Capt. John Mitchell, Cleveland.
S. Chicago	Freighter	W. W. Brown	366	4,800	U. S. Transp. Co., Cleveland.
Detroit	Pass. Str.	Greyhound	285	———	White Star Line, Detroit.
Chicago	Freighter	H. S. Wilkinson	390	5,250	U. S. Transp. Co., Cleveland.
Cleveland	Freighter	James Gayley	436	6,200	Capt. John Mitchell, Cleveland.
W. Bay City	Freighter	Bransford	436	6,200	W. A. Hawgood and others, Cleveland.
Bay City	Freighter	Etruria	434	6,500	H. A. Hawgood
West Superior	Freighter	Sonora	366	4,800	G. A. Tomlinson, Duluth.
West Superior	Freighter	Sultana	366	4,800	G. A. Tomlinson, Duluth.
Lorain	Freighter	C. W. Watson	400	5,500	J. C. Gilchrist, Cleveland
Lorain	Freighter	F. W. Hart	400	5,500	J. C. Gilchrist, Cleveland.
Buffalo	Freighter	Wm. Nottingham	400	5,500	J. C. Gilchrist, Cleveland.
Bay City	Freighter	A. E. Stewart	376	4,900	A. E. Stewart, Detroit.
S. Chicago	Freighter	Luzon	366	4,800	E. D. Carter, Erie, Pa.
Lorain	Freighter	Steel King	400	5,600	J. C. Gilchrist, Cleveland.
Wyandotte	Freighter	Wm. F. Fitch	366	4,800	Franklin Trans. Co., Cleveland.
Cleveland	Freighter	W. C. Richardson	374	4,900	Richardson Transp. Co., Cleveland.
Chicago	Pkg. Frtr.	Milwaukee	345	4,100	Western Transit Co., Buffalo.
W. Bay City	Freighter	L. C. Smith	434	6,200	U. S. Transportation Co., Cleveland.
Wyandotte	Pass. Str.	Columbia	216	———	Detroit, B. I. & Windsor Ferry Co., Detroit.
Lorain	Freighter	J. M. Jenks	434	6,200	Arthur Hawgood and others, Cleveland.
Lorain	Freighter	Harold B. Nye	400	5,600	W. A. Hawgood and others, Cleveland.
Chicago	Freighter	Panay	366	4,800	E. D. Carter, Erie, Pa.
Buffalo	Barge	Maitland	380	5,350	Franklin Transp. Co., Cleveland.
W. Superior	Freighter	James H. Hoyt	376	5,000	Provident Steamship Co., Duluth.
Lorain	Freighter	Frank H. Goodyear	436	6,200	Capt. John Mitchell, Cleveland.
Cleveland	Car ferry	Pere Marquette No. 18	350	———	Pere Marquette Ry. Co.
Wyandotte	Pkg. Frtr.	Muncy	372	5,000	Anchor Line, Buffalo, N. Y.
Lorain	Freighter	Moses Taylor	436	6,200	Capt. John Mitchell, Cleveland.
Cleveland	Car ferry	Manistique	350	———	Manistique, Marquette & Northern Ry. Co., Manistique, Mich.
Wyandotte	Pkg. Frtr.	Tionesta	360	4,500	Anchor Line, Buffalo, N. Y.
S. Chicago	Freighter	George B. Leonard	400	5,600	Capt. W. W. Brown, Cleveland.
Lorain	Freighter	H. B. Hawgood	434	6,200	H. A. Hawgood, Cleveland, O.

JENKS SHIP BUILDING CO., PORT HURON, MICH.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Port Huron	Freighter	John B. Cowle	440	6,500	Capt. W. W. Brown, Cleveland.

BERTRAM ENGINE WORKS CO., TORONTO, ONT.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Toronto	Pass. Str.	Montreal	340	———	Richelieu & Ont. Nav. Co., Montreal.
Toronto	Freighter	Tadenac	257	2,800	St. Lawrence & Chicago Navigation Co., Toronto, Ont.

CRAIG SHIP BUILDING CO., TOLEDO, O.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Toledo	Freighter	Redondo	200	1,800	Swain & Hoyt, San Francisco, Cal.
Toledo	Freighter	Charles Beatty	220	2,000	Chas. Beatty, of Buffalo, and others.
Toledo	Oil Str.	Toledo	263	2,800	Sun Oil Co., Pittsburg, Pa.
Toledo	Freighter	Thomas Adams	376	5,000	Thos. Adams and others, Detroit.

JAMES DAVIDSON, WEST BAY CITY, MICH

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
W. Bay City	Barge	Chieftain	360	6,100	James Davidson, W. Bay City, Mich.

COLLINGWOOD SHIP BUILDING CO., COLLINGWOOD, ONT.

Where built.	Type.	Name of Vessel.	Length over-all, ft.	Carrying Capacity.	Name and address of owner.
Collingwood	Barge	Agawa	390	5,600	Algoma Central S. S. Co., Sault Ste. Marie, Ont.

MARINE PATENTS.

Copies of these patents can be obtained by sending ten cents in stamps to Siggers & Siggers, patent lawyers, suite 11, National Union building, Washington, D. C.

839,321. Boat. William A. Richardson, Corsicana, Tex.

839,434. Construction of piers and the like. Allen N. Spooner, New York, N. Y.

839,508. Sweep or wreck finder. Enos B. Petrie, New York, N. Y.

839,595. Means for propelling rowboats. Vincent Johnson, Aspen, Colo.

839,644. Governor for marine engines. William H. Richardson, Thebarton and Frederick L. Woods, Brompton, South Australia, Australia.

839,672. Swimming machine. John Stub, New York, N. Y.

839,700. Course and bearing finder for vessels. John N. Ansell, San Francisco, Cal.

839,826. Boat Propeller. Samuel N. Edgar, Greenville, Tex.

839,897. Marine Propeller. Ozro P. Smith, South Framingham, Mass., assignor to himself and John L. Young, South Framingham, Mass.

840,018. Apparatus for Searching of Sunken Bodies. Max von Schoultz, St. Petersburg, Russia.

840,099. Device for Taking in Coal at Sea. Heinrich O. Adam, Dresden, Germany.

840,198. Knockdown Sailing Attachment for Rowboats. Charles L. Burgoyne, Norwood, O.

840,548. Boat Propeller. George F. Atwood, Wakefield, Mass.

840,646. Electric Time Switch for Beacons. Robert P. Nelms, Jacksonville, Fla.

840,684. Floating Crane and the Like. Alfred Bode and Karl Bottcher, Benrath, Germany.

840,944. Hand Power Propeller. Nels Johnson, Chicago, Ill.

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ALGONAC.

Bge. Arenac
Schr. Culligan, C. P.
Bge. Interlaken
Str. Langell, Simon
Schr. Minch, Sophia
Bge. Moore, W. K.
Str. New York.

ALPENA, MICH.

Bge. Mingoe

ASHLAND.

Str. City of Naples
Str. Mecosta

ASHTABULA.

Str. Bessemer
Schr. Chase, Stephen
Bge. Doherty, M.
Str. Eads
Str. Hill
Str. Hutchinson, J. T.
Str. McDougall
Str. Rockefeller
Str. Stanton, John
Str. Superior City
Str. Woodruff, Lewis

BAYFIELD, WIS.

Str. Barker

BAY CITY, MICH.

Bge. Brainard, Kate
Schr. Chieftain
Bge. Dayton
Str. Donaldson, J. P.
Str. Gen. Garretson
Bge. Jackson, G. K.
Bge. Ketchum, J. L.
Str. Maine
Str. McIntosh, H. P.
Bge. Wright, A. W.

BENTON HARBOR, MICH.

Str. City of Benton Harbor
Str. City of Chicago
Str. Holland
Str. Puritan

BLIND RIVER, ONT.

Schr. Plymouth

BUFFALO.

Str. Adams, Thomas
Bge. Aloha
Str. Auburn
Str. Australia
Str. Bethlehem
Str. Bielman, C. F.
Str. Binghamton
Str Boston
Str. Brower, A. G.
Str. Bransford
Str. Brown, Harvey H.
Str. Buffalo
Str. Butler, Jos. G. Jr.
Bge. Butman, Myron
Str. Canisteo
Str. Carnegie, Andrew
Bge. Carpenter, A. A.
Str. Chicago
Str. Chili
Str. City of Genoa
Str. Clarion
Str. Commodore
Str. Conlby, Harry
Str. Cowle, John B.
Str. Curry, S. S.
Str. Dalton, H. G.
Str. Davidson
Str. Duluth
Str. Elphicke, C. W.
Str. Elphicke, Mary C.
Str. Flagg
Str. French, G. Watson
Str. Gayley, James
Str. Gilchrist
Str. Gilchrist, Jos. C.
Str. Goodyear, F. H.
Str. Gould, Geo. J.
Str. Grammer, G. J.
Str. Hanna, D. R.
Str. Hawgood, H. B.
Str. Hawgood Henry A.
Str. Heffelfinger, F. T.
Str. Holmes, Edwin F.
Str. Ionia
Str. Ishpeming
Str. Japan
Str. Jenks, J. M.
Str. Juniata
Str. Jupiter
Str. Leonard, Geo. B.
Str. Luzon
Str. Marshall, A. M.
Str. McWilliams, J. J.
Str. Milwaukee
Str. Mohegan
Str. Mullen, Martin
Str. Muncy
Str. Northern King
Str. Northern Light
Str. Northern Wave
Str. North Land
Str. North Star
Str. North West
Str. Nottingham, Wm.
Str. Nye, Harold B.
Str. Olympia
Str. Osborne, F. M.
Str. Owego
Str. Panay
Str. Peavey, Geo. W.
Str. Penoscot
Schr. Redington, Nellie
Str. Rees, W. D.
Str. Riddle, J. Q.
Str. Rome
Str. Sacramento
Str. Saxona
Str. Senator
Str. Seneca
Str. Starrucca
Str. Stearn, Abraham
Str. Steinbrenner, H.
Str. Sill, H. S.
Str. Sinaloa
Str. Smith, Hurlbut W.
Str. Smith, L. C.
Str. Smith, Monroe C.
Str. Smith, Wilbert L.
Str. Sonoma
Str. Sonora
Str. Spokane
Str. Sultana
Str. Superior
Str. Susquehanna
Str. Syracuse
Str. Taylor, Moses
Str. Troy
Str. Tuscarora
Str. Vulcan
Str. Wallace, James C.
Str. Walsh, James P.
Str. Ward, Eber
Str. Warner, Chas. M.
Str. Weeks, J. L.
Str. Whitney, D. M.
Bge. Wilson, Annebell
Str. Wilson, Capt. Thomas
Str. Wisconsin
Str. Wright, A. P.
Str. Yonkers
Str. Yosemite
Str. Zillah

BYNG INLET, ONT.

Bge. Francomb, J. A.

CHEBOYGAN, MICH.

Str. Boyce, Isabella J.
Str. Elva
Schr. Maxwell, A. C.
Str. Yt. Sigma

CHICAGO.

Str. Armour, P. D.
Schr. Ashland
Str. Barth, L. L.
Lighter Batavia
Str. Black Rock
Schr. Butcher Boy
Str. Chemung
Str. Mueller
Str. Niagara
Str. Niko
Schr. Norris, Alice B.
Str. Ogdensburg
Str. Oglebay, E. W.
Str. Oscoda
Schr. City of Chicago
Str. City of Fremont
Str. City of London
Str. Codorus
Bge. Connelly Bros.
Schr. Corning, Ida
Str. Davidson, A. D.
Schr. Delta
Str. Egan, W. M.
Str. Empire State
Schr. Filer, D. L.
Str. Fitzgerald, R. P.
Str. Fletcher, F. W.
Bge. Fryer, Robert L.
Bge. Halsted
Bge. Harold
Str. Hiawatha
Str. Hines, L. Edw.
Str. Howe, George C.
Str. James
Str. Kalkaska
Str. Keefe, J. S.
Str. Langdon
Schr. Law, Lizzie
Str. Lewiston
Schr. Marvin, S. E.
Str. McVittie
Str. Mohawk
Schr. Nott, Richard
Str. Pahlow, Louis
Str. Panther
Str. Parent, S. N.
Str. Peterson
Schr. Peterson, Annie M.
Str. Pine Lake
Str. Plankington, John
Str. Pope, E. C.
Str. Prentice, I. H.
Str. Ralph, P. J.
Str. Ramapo
Str. Rend, W. P.
Str. Rhodes, R. R.
Str. Rutland
Str. Saranac
Str. Sawyer, Philetus
Str. Thompson, Emma E.
Str. Three Brothers
Schr. Tilden, S. J.
Str. Tioga
Str. Uganda
Str. Utica
Str. Whitney, D. C.
Str. Wiehe, Trude R.
Str. Williams, Geo. F.
Str. Winnipeg

CLEVELAND.

Schr. Anderson, Alex.
Str. Angeline
Bge. Antrim
Str. Arizona
Schr. Athens
Bge. Baldwin
Bge. Bloom, Nelson
Bge. Bottsford
Tug L. T. Brogan
Str. Bunsen
Str. Cadillac
Str. Centurion
Schr. Chattanooga
Schr. Chickamauga
Str. Choctaw
Str. City of Buffalo
Str. City of Erie
Str. Colgate
Bge. Constitution
Tug Cooper, George
Str. Corsica
Str. Cort
Schr. Crete
Tug Dreadnaught
Str. Eddy, C. A.
Schr. Edwards I. R.
Str. Empire City
Str. Falcon
Str. Fitzgerald, W. E.
Str. Fulton
Bge. Georger, F. A.
Bge. Godfrey, J.
Schr. Grampian
Str. Hanna, M. A.
Str. Harper, John
Bge. Hartnell, Geo. E.
Bge. Hattie
Str. Hebard, Chas. S.
Schr. Howland, Thos. H.
Str. Hoyt, James H.
Str. Iron Age
Bge. Iron Cliff
Str. Joliet
Str. Kirby, S. R.
Str. Leuty, D.
Str. Lindsay, A. G.
Str. Linn
Str. Livingstone, Wm.
Bge. Lozen, I. B.
Tug Marguerite
Str. Maricopa
Str. Marina
Bge. Martha
Str. Masaba
Str. Massachusetts
Str. Mather
Str. Maytham, Thos.
Str. McGregor, Mary A.
Bge. McLachlan, Mary E.
Str. Merrimac
Str. Miller, P. P.
Str. Mitchell, Samuel
Str. Monohansett
Str. Neilson
Tug Nelles, George T.
Str. Nimick, Alex.
Schr. Orton, M. E.
Str. Pathfinder
Str. Pawnee
Str. Pioneer
Bge. Polynesia
Str. Pontiac
Str. Pratt, Pascal P.
Bge. Racine
Str. Rhoda, Emily
Str. Roumania
Bge. Sagamore
Str. Saxon
Schr. Scotia
Bge. Shawnee
Str. Shores, E. A. Jr.
Str. Shrigley, Jas. H.
Tug Smith, L. P.
Str. Stephenson
Str. Stewart, Rhoda
Bge. Thompson, A. W.
Str. Tower, C.
Bge. Twin Sisters
Str. Vermillion
Str. Volunteer
Str. Wallula
Str. Warner, A. S.
Bge. Warriner
Str. Watson, C. W.
Tug Welcome
Schr. Young, Wm. A.
Bge. 133

COLLINGWOOD, ONT.

Schr. Agawa
Britannic
Str. Caribou
Str. City of Midland
Str. City of Toronto
Str. City of Windsor
Str. Germanic
Str. Majestic
Str. Manitou
Str. Orr, Arthur
Str. Turret Court

CONNEAUT.

Str. Briton
Str. City of Bangor
Str. Corona
Str. Houghton
Str. Mariska
Str. Marquette & Bessemer No. 1
Str. Marquette & Bessemer No. 2
Str. Maunaloa
Str. Morse
Str. Peavey, Frank H.
Str. Ream, N. B.
Str. Rensselaer
Str. Wells, Frederick B.

DEPOT HARBOR, ONT.

Str. Kearsarge
Str. Orr, George N.
Str. Ottawa

DESERONTO.

Bge. Arctic
Tug Ranger
Str. Reliance
Tug Rescue
Str. Ross, Ella
Str. Where Now

DETROIT.

Str. Arundell
Bge. Bell
Str. Kongo
Str. Marshall, Samuel
Str. Bermuda
Tug Cadillac
Str. City of Alpena
Str. City of Cleveland
Str. City of Detroit
Str. City of Grand Rapids.
Str. City of Mackinac
Str. City of the Straits
Str. City of Toledo
Str. Eastern States
Bge. Favorite
Str. Greyhound
Str. Houghten, H.
Str. Houghten, Mary
Str. Huron
Str. Idlewild
Bge. King, C. G.
Schr. McGregor, Wm.
Schr. Monguagon
Str. Orinoco
Str. Ottawa
Str. Owana
Str. Rappahannock
Str. Starke, C. H.
Str. State of New York.
Str. State of Ohio
Str. Stone, Amasa
Str. Tashmoo
Str. Tecumseh
Str. Tempest
Str. Tionesta
Str. Wade, J. H.
Str. Western States

DULUTH.

Str. Amazonas
Str. America
Str. Ball Brothers
Str. Beatty, Charles
Str. Bon Ami
Str. Bradshaw
Str. Brown, W. W.
Str. Craig, George L.
Str. Cranage, Thomas
Str. Crerar, John
Str. Cuddy, Loftus
Str. Easton
Str. Edenborn
Str. Goulder, Harvey D.
Str. Gratwick, Wm. H.
Str. Hecker, Frank J.
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Str. Ireland, R. L.
Str. Kensington
Str. Lake Shore
Str. Lambert, John
Str. Mack, Wm. H.
Str. Mahoning
Str. Malietoa
Str. Mariposa
Str. Maritana
Str. Mars
Str. Mataafa
Schr. Matanzas
Str. Matoa
Str. Merida
Str. Minch, Anna C.
Str. Moore
Str. Northern Queen
Str. North Wind
Str. Norton, D. Z.
Str. Poe
Str. Reynolds, S. C.
Str. Russel, George H.
Str. Schuylkill
Str. Sharples, John
Str. Smith, Henry B.
Str. Smith, Lyman C.
Str. Socapa
Str. Soo City
Str. Jesse Spalding
Str. Steel King
Str. Van Hise
Str. Venus
Str. Walker, P. G.
Str. Widener
Str. Winnebago
Str. Wolvin
Str. Wolvin, Augustus B.
Str. Yale
Bge. 132

ECORSE, MICH.

Str. Andaste
Str. Delaware
Str. Frontenac
Str. Mather, Wm. G.
Str. Michigan
Str. Presque Isle
Str. Sheadle, J. H.
Str. Snyder, Wm. P.
Str. White, Peter

ERIE, PA.

Str. Alaska
Bge. Bryn Mawr
Str. Cambria
Str. Carter, E. D.
Str. Coralia
Bge. Corliss
Str. Crescent City
Str. Fairbairn
Bge. Fritz
Str. Gates
Str. Griffin
Bge. Jenney
Str. Lehigh
Bge. Magna
Bge. Maia
Bge. Maida
Bge. Malta
Bge. Manda
Bge. Manila
Str. Manola
Str. Palmer
Schr. Penobscot
Str. Perkins
Str. Queen City
Bge. Roebling
Bge. Thomas
Str. Wawatam
Str. Zenith City
Bge. 117
Bge. 131
Bge. 137
Str. Zimmerman, Eugene

ESCANABA, MICH.

Schr. Abyssinia
Str. Sherwin, John
Str. Uranus

FAIRPORT, O.

Str. Maruba
Str. Shaw
Str. Siemens

FORT WILLIAM, ONT.

Str. Bixby, W. K.
Str. Midland King
Str. Minch, Philip
Str. Wood, J. B.

GARDEN ISLAND, ONT.

Schr. Burma
Str. Calvin, D. D.
Schr. Ceylon
Tug Chieftain
Tug Frontenac
Str. India
Tug Johnston, W.
Tug Parthia
Str. Simla

GODERICH, ONT.

Str. Newmount
Str. Turret Cape
Str. Turret Chief

GRAND HAVEN, MICH.

Str. Pentland

GREEN BAY, WIS.

Str. Hart, Eugene C.
Str. Hart, Fannie C.

HAMILTON, ONT.

Str. Arabian
Str. Macassa
Str. Modjeska

HURON, O.

Schr. Smith, Jaine E.
Tug Stickney, Natt

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KINGSTON, ONT.

Str. Aletha
Str. America
Str. Blain, Jessie
Str. Caspian
Str. Islander
Str. New Island Wanderer
Str. North King
Str. Pierrepont
Str. Ramona
Str. Rideau King
Str. Rideau Queen
Str. St. Lawrence

LITTLE CURRENT, ONT.

Str. Minnie M.

LORAIN.

Str. Clemson, D. M.
Str. Hart, F. W.
Bge. Holley
Str. Kerr, D. G.
Bge. Krupp
Str. LaSalle
Bge. Magnetic
Bge. Marcia
Bge. Marsala
Str. Morrell, D. J.
Bge. Nasmyth
Str. Princeton
Str. Reed, James H.
Str. Rogers, Wm. A.
Tug Sullivan, Roger C.
Str. Sylvania
Str. Townsend, Edward Y.
Str. Trevor

MANISTEE, MICH.

Schr. Buckley, Edw.
Str. Eastland
Tug Hunter Savidge
Str. Illinois
Str. Kansas
Schr. Luckey, A. W.
Str. Marshall, Maggie
Str. Missouri
Str. Nessen, N. J.
Str. Neff, Sidney O.
Str. Pere Marquette No. 3
Pere Marquette No. 4
Str. Pere Marquette No. 6
Schr. Sands, Isabella
Str. Schroeder, John
Str. Soper, Albert
Tug Third Michigan
Str. Went, R. C.
Str. Wotan

MANITOWOC, WIS.

Bge. Aurora
Str. Brazil
Str. Carolina
Str. Case
Str. Chicago
Str. Christopher Columbus
Str. City of Berlin
Str. Georgia
Str. Majestic
Str. Raleigh
Str. Reis, Wm. E.
Str. Sheboygan
Str. Tacoma
Str. Tampa
Bge. Tokio
Str. Virginia

MARINE CITY.

Schr. Biwabik
Bge. Dorca Pendal
Str. Flint, O. T.
Bge. Gawn, Thos.
Str. Gogebic
Str. King, George
Str. Martin, S. K.
Bge. Melvina
Bge. Rand
Str. M. Sicken
Str. Sparta
Bge. St. Joseph
Str. Street, Charles A.
Bge. Teutonia
Bge. Tyson, E. E.

MICHIGAN CITY, IND.

Str. Colborn, A. R.
Str. Hinton, Francis
Str. Parks, O. E.
Str. Roosevelt, Theodore

MIDLAND, ONT.

Tug Betamora
Tug Magnolia
Str. Midland Queen
Str. Neebing
Tug Reliance
Tug Traveler

MILWAUKEE.

Bge. Amazon
Str. America
Str. Aurania
Str. Boyce, Mary H.
Str. Brown, Fayette
Str. Caledonia
Str. Castalia
Str. City of Glasgow
Str. City of Paris
Str. City of Rome
Str. Clarke, E. A. S.
Str. Clement, S. M.
Str. Colonial
Str. Cumberland
Str. Devereux, J. H.
Str. Dunham, Jas. S.
Str. Earling, E. J.
Str. Ericsson
Str. Flower, R. P.
Str. Fryer, Robert L.
Str. Gilchrist, F. W.
Schr. Granada
Str. Hand, C. C.
Str. Helena
Str. Hennepin
Str. Hilton
Str. Holden, H. S.
Str. Iron King
Schr. Iron Queen
Str. Iroquois
Str. Italia
Str. Kelton, M. E.
Str. Lagonda
Str. Langham
Str. Lansing
Str. Mack, William S.
Str. Major
Str. Manchester
Str. Marion
Str. Maryland
Schr. Mitchell, Mary B.
Str. Neff, Charles S.
Str. Nrosho
Str. Neshoto
Str. Normandie
Str. Nyanza
Str. Oades, John
Str. Oliver, Henry W.
Str. Omaha
Str. Oregon
Str. Pabst, Fred
Str. Paine, Wm. A.
Str. Peck, E. M.
Str. Pueblo
Str. Republic
Str. Richardson, W. C.
Saunders, E. N.
Str. Schlesinger, F.
Str. Schuck, R. E.
Str. Scranton, Walter
Str. Sellwood, Joseph
Str. Selwyn Eddy
Str. Shaughnessy, Sir Thomas
Str. Shenandoa
Str. Shores, Adella
Str. Squire, F. B.
Str. Topeka
Str. Vance, F. L.
Str. Venezuela
Str. Waldo, L. C.
Str. Watt
Str. White, Pendennis
Str. Wolf, W. H.

MONTREAL, QUE.

Str. Boucherville
Str. Longueuil

MUSKEGON, MICH.

Schr. Davis, Lyman M.
Str. Markham, George C
Str. Stephenson, S. M.
Str. Wilson, Mathew.

NORTH TONAWANDA.

Str. Bradley, C. H.
Schr. Brightie
Str. Clyde
Str. Cormorant
Str. Curtis, C. F.
Schr. Delaware
Str. John F. Eddy
Bge. T. S. Fassett
Str. Fleetwood
Schr. Genoa
Schr. Goshawk
Str. Green, C. H.
Schr. Helvetia
Bge. Holland, N. C.
Schr. Jenness, B. W.
Str. Ketcham, John B. H.
Str. Mercur, Fred
Bge. Moravia
Str. Myron
Str. Oceanica
Schr. Our Son
Str. Packer, H. E.
Schr. Page, M. W.
Schr. Paisley
Bge. Pennington, B. K.
Schr. Peshtigo
Schr. Redfern, R. C.
Str. Sawyer, W. H.
Schr. Tuxbury, A. C.
Str. Veronica
Schr. Woolson, Mary

OGDENSBURG, N. Y.

Bge. Argosy
Str. Averell
Str. Hall, Henry B.
Str. Haskell
Str. Heela
Schr. Lyon, Mary
Schr. Mathews, Jennie
Schr. Middlesex
Str. Monteagle
Str. Nipigon
Str. Prince
Tug Proctor, Wm. L.
Str. Rugee, John
Schr. Sherman, W. A.
Str. Wallace, Robert

OWEN SOUND.

Str. Algonquin
Str. Matthews, W. D.
Str. Rosedale

PESHTIGO HARBOR, WIS.

Str. Ames, J. C.
Bge. No. 1
Str. Fischer, S. M.

PORT ARTHUR, ONT.

Str. Ames, A. E.
Str. Ionic
Str. Plummer, J. H.
Str. Saronic
Str. Scottish Hero

PORT COLBORNE, ONT.

Schr. Carter, C. J.
Str. Carter, W. J.

PORT DALHOUSIE, ONT.

Str. Lakeside

PORT HURON, MICH.

Str. Beard, James
Britannic
Str. Cartagena
Str. Ford, J. C.
Str. Groh, Mary
Str. Hayward, A. D.
Str. Ross, M. M.
Str. Russia

QUEBEC.

Str. Tadousac

SAGINAW, MICH.

Tug McLean, Andrew A.
Schr. Buckhout, B. B.
Schr. Cahoon, T. H.
Schr. Lester, T. G.
Str. Warren, Homer
Schr. White & Friant

SANDUSKY, O.

Str. Annie Laura
Bge. Bourke, Mary N.
Str. Hays, R. B.
Str. Mary H.
Bge. McVea, E. J.
Bge. Nester, George
Str. Schoolcraft
Str. Wehrle, A. Jr.

SANDWICH, ONT.

Str. Benton
Bge. Richards, Rube

SARNIA, ONT.

Str. Edmonton
Str. Huronic

SAUGATUCK.

Str. Saugatuck

SAULT STE. MARIE, ONT.

Str. Badger State
Schr. Barlum, John J.
Str. King Edward
Str. Leafield
Str. Ossifrage
Str. Paliki

SHEBOYGAN, WIS.

Schr. Becker, R. H.
Schr. Bell, Rosa
Str. Chipman
Schr. City of Grand Haven
Schr. Dresden, J.
Str. Gill, Alice M.
Schr. Moore, H. D.
Str. Neptune
Schr. Petril
Schr. Quickstep
Schr. Rosebud
Tug Satisfaction
Schr. Stevens, J. H.
Str. Widlar, F.
Str. Umbria

SOMBRA, ONT.

Bge. Rawson, Levi
Bge. Spademan, C.
Bge. Whitney, Grace

SOREL, QUE.

Str. Beaupre
Str. Berthier
Str. Chambly
Str. Chicoutimi
Str. Montreal
Str. Murray Bay
Str. Picton
Str. Prescott
Str. Hamilton
Str. Loprairie
Yt. Margota
Str. Cornwall
Str. Crockville
Str. Fire Fly
Str. Three Rivers
Str. Varennes
Str. Quebec
Str. St. Irene
Str. Terrebonne

SOUTH CHICAGO.

Str. Admiral
Str. Ball, F. C.
Str. Black
Str. Brown, W. L.
Str. Corey
Str. Cornell
Str. England, R. W.
Str. Frick
Str. Gary
Str. German
Str. Manitou
Str. Mauch Chunk
Str. Morgan, J. P.
Str. Ravenscraig
Str. Rogers
Str. Roman
Str. Saturn
Str. Smith, B. Lyman
Str. Western Star
Str. Wilkesbarre

SOUTH HAVEN, MICH.

Str. City of Kalamazoo
Str. City of South Haven
Str. Glenn
Str. Williams, H. W.

ST. CLAIR, MICH.

Str. City of Holland
Str. Douglas
Str. Maud
Str. Peshtigo
Str. Pilgrim

ST. IGNACE, MICH.

Str. Islander

ST. JAMES, MICH.

Schr. Simmons, Rose

STURGEON BAY.

Bge. Advance
Bge. Hurd, J. L.
Bge. Kellogg
Tug Leatham, John
Tug Nelson, George
Bge. Pewaukee
Bge. Senator
Tug Smith

SUPERIOR.

Str. Colonel
Str. Fitch, W. F.
Str. Hanna, L. C.
Bge. Maitland
Str. Mather, Samuel
Str. Stackhouse, Powell

THOROLD, ONT.

Str. Haddington
Str. Iroquois

TOLEDO, O.

Str. Albright, John J.
Schr. Barnes, C. C.
Bge. Carrington
Str. Cherokee
Schr. Chippewa
Str. Commerce
Str. DoVille, R. E.
Str. Dussault, D.
Str. Ella G.
Str. Ellwood
Schr. Exile
Str. Gilbert
Str. Harvard
Str. Holland, Robert
Schr. Houghton, Geo. G.
Schr. Keith, Ida
Str. Laura D.
Str. Murphy
Str. Rust, David W.
Str. Sahara
Bge. Santiago
Schr. Schuette, John
Bge. Smeaton
Str. Syracuse
Bge. Tyrone
Str. Victory
Str. Walter D.
Str. Weston, Charles
Str. Wilkinson, Horace S.
Str. Yuma

TONAWANDA.

Str. Aztec
Bge. Case
Schr. Hutchinson, Emma C.
Schr. Miztec
Str. Neff, Lucy
Str. Pridgeon, John
Str. Runnels, H. E.
Bge. Wall, Charles

TORONTO.

Str. Belleville
Str. Cayuga
Str. Chicora
Str. Chippewa
Str. Corona
Str. Garden City
Str. Kingston
Str. Ongiara
Str. Seguin
Schr. St. Louis
Str. Toronto
Str. Turbinia

TWO HARBORS, MINN.

Bge. 118
Bge. 130
Bge. 134

WASHBURN, WIS.

Schr. Montezuma.

WINDSOR, ONT.

Str. Pellatt, H. M.

The Indiana Transportation Co., Chicago, has purchased from Booth & Co., Duluth, the steamer Soo City, which will be operated in conjunction with the steamer Theodore Roosevelt, between Chicago, Gary and Michigan City, Ind.

Capt. Charles B. Galton, master of the Loftus Cuddy, who laid his boat up in Duluth, left Cleveland for his home last Saturday, after a visit of over a week.

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QUESTIONS FOR MASTERS AND MATES. NO. 26.

385. What is the standard compass used for?

386. How should it be mounted?

387. What kind of iron would you avoid particularly in placing this compass?

388. What kind of magnetism in the end of vertical iron farthest from the earth in north magnetic latitude?

389. What effect will this kind of magnetism have on the north end of the compass needle?

390. For what other reason is the standard compass mounted above the rail, other than to diminish the magnetic force within the ship?

391. On a steam vessel what are the different pieces of equipage made of vertical iron, or comprise vertical iron?

392. In adjusting a compass is the variation adjusted in with the deviation?

393. Will the magnetic influence be stopped by placing anything between the compass and the iron and steel that disturbs it?

394. Will brass, copper, or lead effect the compass? Why?

395. Will magnetism go through brass or copper?

396. Will magnetism pass through wood?

397. Has any effective magnetic screen ever been produced?

398. How do you determine a true course or bearing from that given by compass?

399. What is sub-permanent magnetism?

QUESTIONS FOR WHEELSMEN AND WATCHMEN.—No. 27.

271. Give true course and distance from a point 2 miles N. of White Fish Pt. lighthouse to a point 3 miles N. of Huron island lighthouse?

272. Give correct magnetic course and distance from a point 3 miles N. of Huron island lighthouse to a point 1 mile south of Portage entry.

273. Give true course and distance from Marquette breakwater light to a point 4 miles N. of Copper Harbor lighthouse passing between Keweenaw point and Manitou Island.

274. Give true course and distance from Marquette breakwater light to a point 1 mile S. of Portage entry.

275. Give correct magnetic course and distance from a point 2 miles N. of White Fish point lighthouse to a point 1 mile SW x S½S from Passage island lighthouse.

276. Give correct magnetic course and distance from a point 1 mile SW x S½S from Passage island lighthouse to entrance Fort William Harbor.

277. Give true course and distance from a point 3 miles S. of Thunder Cape lighthouse to a point 1 mile N. W. from La Pointe lighthouse.

278. Give true course and distance from a point 3 miles S. of Thunder Cape lighthouse to the entrance of Duluth Harbor.

279. Coming from the eastward and wishing to anchor under Grand Island how would you successfully pilot your boat to Williams' Landing Anchorage?

280. Coming from the northward and entering on the east side of Grand Island, explain how you would pilot your boat so as to bring her safely into South Bay?

281. Wishing to come to an anchorage at Williams' Landing explain how you would do so entering from west side of Grand Island?

QUESTIONS FOR OILERS AND WATERTENDERS.—NO. 22.

210. Supposing you wanted to lay up a forward sea cock during freezing weather how would you do same; steamer to remain in commission?

211. An engine having 42 in. stroke the slide valve has 9 in. travel, the lap of same 3 in. of the steam parts with a lead of ¼ in., at what distance from the end of the stroke will the steam be cut off at?

212. What would be the horsepower of an engine the cylinder of which is 50 in., stroke 40 in., revolutions 68, the mean effective pressure 35 lbs.?

213. In replacing a broken shaft could one be made stronger yet of slight difference in weight? If so, how?

214. Name a few important ways or devices of saving fuel in connection with the modern marine engine?

215. Why are jet condensers more in use on the lakes than circulating?

216. In running free during a heavy sea what precaution would you take to prevent damage to engine?

217. What precaution do you take before starting up an engine?

218. Do some engines require more than others?

219. Should one of the air pump valves give out which one would be least noticeable?

220. Explain what is meant by the term lbs. of vacuum?

Capt. Ed. Sullivan, of the Hanna fleet, is planning on pulling up stakes at his native home, Trenton, Mich and moving to Cleveland with Mrs. Sullivan Capt. Ed. was married to a Trenton belle at Erie during the summer.

McARTHUR'S PORTABLE FIRE ESCAPE.

The McArthur portable fire escape or Jacob's ladder, which is now being introduced on the lakes, is meeting with much success. Capt. Hugh McAlpine, master of the steamer Erie, has written as follows:

"We have tried and tested a sample of the McArthur Portable Fire Escape and Jacob's ladder and consider it one of the best of its kind we have ever seen for any boat or building which have straight up and down sides to which the ladder can be applied."

The Upson-Walton Co. has written the following endorsement of it.

"We have in our store a sample of the McArthur patent portable metallic fire escape or Jacob's ladder. It is light and strong, non-combustible non-corrosive, and just the thing for passenger boats, steam freighters or other vessels, also for manufacturers, hotels, apartment houses, etc. All ought to be equipped with this most useful appliance."

TRADE NOTES.

The Independent Pneumatic Tool Co., has purchased a large four-story brick building adjoining its plant at Aurora Ill., giving it approximately 100,000 sq. ft. of additional floor space. About $65,000 will be spent in new machinery.

The Atlantic Works Incorporated, 28th street, and Gray's Ferry Road, Philadelphia, recently received an order from the National Wrecking Co., Milton, Del., for one of their B-17 adjustable bevel band saw machines which are built specially for boat yard work.

The Illinois Boiler Cleaning Compound Co., 280 Hudson avenue, Chicago, has just put out a little catalog descriptive of their compound for cleaning and preserving steam boilers. They represent that their compound prevents the formation of scale, pitting and corrosion in steam boilers. The compound is purely vegetable and is put up in powdered form.

The Falls Hollow Staybolt Co., Cuyahoga Falls, O., report that their business during 1906 was 50 per cent greater than any previous year's showing. The company attributes this great success to the fact that mechanical men are more and more realizing the advantages and economy in staying their modern high-pressure locomotive and marine boilers with Falls Hollow staybolt iron.

G. E. Phillips has been appointed assistant traffic manager of the White Star Line of Detroit.

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